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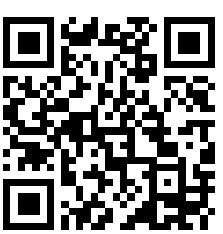

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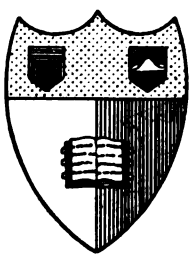

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THE JOURNAL OF STATE MEDICINE

A MONTHLY INTERNATIONAL REVIEW OF PREVENTIVE MEDICINE

THE OFFICIAL JOURNAL OF
THE ROYAL INSTITUTE OF PUBLIC HEALTH

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Volume XXVII. JANUARY, 1919. No. 1.

THE PREVENTION OF VENEREAL DISEASE AND THE ABORTIVE TREATMENT OF GONORRHŒA.

BY

BREVET-COLONEL L. W. HARRISON, D.S.O., K.H.P., R.A.M.C.

Lecturer on Venereal Diseases and Medical Officer in Charge, Rochester Row Military Hospital.

A Lecture delivered at The Royal Institute of Public Health.

IN my paper on the "Management of Venereal Disease in the Civil Community,"[1] I gave reasons for the belief that the present war would be followed by a huge increase in venereal disease throughout the country, and that unless it were successfully combated, its influence on the efficiency, prosperity and happiness of the nation would be disastrous. As a preliminary to an address on the prevention of venereal disease it may not be out of place to recapitulate the reasons I advanced for this large prospective increase in venereal disease. During the war there has grown up a huge army of women workers emancipated from domestic control, and large numbers of these have celebrated their freedom by "sowing their wild oats," while others have fallen victim to a sexual temptation which is doubtless stronger in times of war than in peace. The result is that many thousands have become infected with venereal disease. We have the proof of this in the figures collected in various military hospitals as to the occupation of the women who had infected soldiers suffering from venereal disease. I have divided them into two classes—"amateurs," or women who received no payment, and prostitutes, who did. The results show: In Hospital No. 1, out of 1,288 cases of syphilis 83·5 per cent.; in No. 2 Hospital, out of 1,188 cases of venereal disease of all kinds 66·4 per cent.; and in No. 3, out of 5,691 cases 64·6 per cent. were infected by amateurs. Roughly one can say that two-thirds of all the patients in venereal hospitals for Imperial troops are there because of having had sexual intercourse with women who are not prostitutes in the ordinary sense of the word and probably for the most part expect to settle down some day to a respectable married

[1] JOURN. STATE MED., April, 1918.

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life. When you remember that the incidence of venereal disease in the Army stationed at Home has been approximately 48 per 1,000 for the period of the War, you will gather some idea of the number of these women who must be infected. When the War is over and the Army returns home to be disbanded it is certain that for a time there will be considerably more promiscuous sexual intercourse than has prevailed during the War, and the intercourse will be largely with these women who are already infected. It requires no great imagination to see that the result must be an enormous increase in venereal disease throughout the country. I would again remind you that the burden of coping with this venereal disease must chiefly fall on the civil community because it will affect men who have for the most part been demobilized, i.e., civilians no longer subject to military control.

At the date of my last address the time for the civil community to take up the burden of venereal disease in very large numbers seemed far distant, and the necessity for energetic preparation may not have been felt to be urgent. At least I gathered the impression from the subsequent discussion that most people who were taking an interest in venereal disease were fairly well content with the progress being made in the battle against it, and thought that by the time the War came to an end, the civil community would be quite ready to deal with the problem. I must confess that I have not taken that optimistic view, though I realize that, thanks to a comparatively few devoted workers, more has been done in the past four years than in the previous four hundred towards the stamping out of venereal disease. One great thing remains to be done and that is to make the great general public realize what a peril venereal disease is to our national efficiency; that if anything is likely to make a C3 nation of us, it is venereal disease; and how urgently necessary it is that they should understand thoroughly how to protect themselves against it. In spite of the energetic propaganda work of the National Council for Combating Venereal Disease and the support it has received from the Local Government Board, the ignorance of the general public on these matters is nothing less than appalling. On the one hand it leads to a carelessness which fills our venereal hospitals and, on the other, to an unreasoning fear of and a contempt for everything connected with venereal disease which is anything but helpful or encouraging. Sometimes this fear leads to actions which would be rather amusing if they did not

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reveal the pitiable ignorance of large sections of the community. For instance, the vicar of a parish in which one of our venereal disease hospitals is situated, confessed soon after it was established there that his congregation had threatened to forsake him if he called on the officer staff. In that parish there was something approaching an attempt to make the shopkeepers boycot the hospital for fear that the money passed should convey the infection. In another place the confession was made that the reason for not calling on the wife of the officer commanding a venereal hospital who lived, by the way, about two miles from the hospital, was the fear of carrying the disease home to the children. In still another place where it was proposed to establish a venereal hospital on a camp which had lately been vacated by troops, the local editor besought the authorities to remember the boys' school in the neighbourhood and the danger of contaminating an important water supply with the germs of this horrible disease. I could relate numbers of instances which show the same ignorance on the part of the general public regarding these diseases and as I feel that we shall make poor progress until the general public is more enlightened, I cannot help feeling that the prospect of an early peace is finding us dangerously unprepared.

In my last address I discussed the management of venereal disease in the civil community after its development. To-day I should like to review for your subsequent discussion the means by which venereal disease may be prevented, or, in the event of preventive means failing, how the more prevalent—gonorrhœa—can be aborted.

Nobody could fail to support a campaign for the prevention of venereal disease who has appreciated the difficulty of curing it after it has developed. It is true that, in the arsenobenzole and mercurial compounds, we have admirable remedies for the treatment of syphilis—remedies which make the ultimate cure a matter of almost mathematical certainty—but even here the conditions to be fulfilled—the long periods under which the patients have to remain under treatment and observation, for instance, and the skill and care to be expended over each individual case—make the management of syphilis on the large scale which will be necessary an immensely costly business. But syphilis comprises only about a quarter of all venereal disease while gonorrhœa is twice as prevalent, as you will see from this analysis.

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Analysis of 933 cases of venereal disease showing the numbers of each variety: Gonorrhœa 621; syphilis 253; soft chancre 34; other venereal diseases 25.

The successful management of gonorrhœa is immensely more difficult than that of syphilis. As you probably know, gonorrhœa has been looked on very lightly by the laity, and even now large numbers of doctors consider its cure to be a very trifling matter, involving the use of a syringe and the swallowing of some medicine for a few weeks. It is still difficult to make people believe that the cure of gonorrhœa is not simply a matter of reducing a purulent urethral discharge to an insignificant morning drop, or even of causing the drop to disappear; they cannot be made to realize that under a standard of cure which requires less than complete sterilization of the genital passages from the point of view of gonococcal infection the gynæcologist will be just as hard-worked as ever removing diseased Fallopian tubes. The cure of gonorrhœa in the sense of freeing the patient of every gonococcus in his genital passage is one of the most difficult tasks in medicine. When it has to be applied to thousands and thousands of individuals it must be considered to be a desperate public problem, and one which drives us to seek a solution in measures for the prevention of these diseases. I hope to show you that, *from the medical point of view*, the prevention of venereal disease is as easy as its cure is difficult.

The measures for the prevention of venereal disease may be divided into two classes: (*a*) Those which are designed to prevent the establishment of a chain of infection, by securing sexual continence out of wedlock. (*b*) Those designed to break the chain of infection after its establishment, when the first measure has failed.

I do not propose to say much concerning the first of these measures—the securing of sexual continence—because there are many others who are much more competent to speak on this aspect of the subject than I am, and it has already been discussed much more fully than the second, which is more purely medical. Although I do not believe that any campaign which relied only on the teaching of sexual continence could succeed in suppressing venereal disease before the damage had been done, I would not go so far as some in saying that such a campaign is a waste of energy. On the contrary it is easy to prove that measures which have

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indirectly had the effect of distracting men from indulgence in promiscuous sexual intercourse have had a most striking effect in reducing the amount of venereal disease. Much of the reduction in the incidence of venereal disease in the British Army which is illustrated by this table is undoubtedly due to the institution of healthy distractions in the form of games and regimental institutes. The table shows the ratios per 1,000 per annum for venereal disease in the United Kingdom, Aldershot Command and the London District respectively from 1885 to 1913. You will notice that all three show a steady decrease which was interrupted by the South African War. The decrease is most striking in the case of the Aldershot Command, and I am sure that it is no mere coincidence that Aldershot, which was once a station where a soldier's only distractions were in the wet canteen and on the streets, has become a model station in its provision of healthy games and regimental institutes and its general care for the soldier off the parade ground as well as on it. The London District has always shown a very high ratio and I do not think there can be any doubt that it is because there is less to keep a man in barracks and more to tempt him on to the streets in London.

INFLUENCE OF HEALTHY DISTRACTIONS.

TABLE SHOWING THE RATIOS PER 1,000 PER ANNUM OF ADMISSIONS FOR VENEREAL DISEASE IN THE UNITED KINGDOM, ALDERSHOT COMMAND AND LONDON DISTRICT FROM 1885 TO 1913.

Year	United Kingdom	Aldershot	London
1885	275·4	321·7	339·4
1886	237·2	301·1	259·8
1897	127·5	130·0	165·2
1898	121·3	115·2	160·5
1899	111·2	96·2	150·2
1900	85·9	84·4	132·2
1901	95·6	69·8	151·1
1902	110·1	86·0	179·1
1903	109·1	119·7	165·4
1904	107·6	79·1	165·2
1905	90·5	79·9	176·5
1906	81·8	69·0	186·0
1907	72·0	60·0	162·0
1908	68·0	52·0	99·0
1909	66·0	48·0	160·0
1910	65·0	50·0	137·0
1911	60·5	44·1	93·2
1912	56·4	37·1	107·1
1913	50·9	29·8	95·6

I suggest that much more might be done in the way of providing healthy distractions for civilian work-people than is done at present I cannot help thinking that, if we concentrated on the provision of

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working men's clubs which were something better than pot-houses, places where men could have decent meals, accompanied or not by beer if they fancied it, where out-door games were organized, and where men could be really comfortable in their leisure hours, there would be much less boredom and much less wandering about the streets. I am sure that boredom is responsible for more than enough venereal disease, and that if one could reckon up increased efficiency in terms of pounds, shillings and pence, the spending of very large sums of money in providing healthy distractions for the multitude would be a good business proposition.

I should like to devote the remainder of the time at my disposal to the more purely medical aspect of the question—the breaking of the chain of infection before it has become well established. The task may be considered from the female and the male ends of the chain respectively, and the question arises which is the most hopeful one to attack. Obviously that is the end on which to concentrate our greatest effort, without prejudice to any subsidiary attempt we make at the other. If one reviews the literature on the prevention of venereal disease one finds much on the inspection and segregation of prostitutes but comparatively little on measures which are applicable to men. Yet I am sure that it should be very much the other way about. When we have achieved all that has ever been proposed with regard to women we shall have touched only the fringe of the subject. The proper inspection of women on a large scale is impracticable and reliance on certificates of good health based on such examinations as are practicable for the multitude is reliance on a very frail reed. The safest plan in dealing with professional prostitutes is to act on the assumption that all are diseased and to teach them how to prevent their conveying infection to the men with whom they consort. I know that where this has been done the proportion of infections to intercourses with the women concerned has been less than 0·15 per cent., which compares with a rate of from 2 to 7 per cent. following exposures without precautions. But even if we could make prostitutes safe by these means we should be left with a perfectly hopeless class—the amateurs—who are responsible for quite two-thirds of all the venereal disease in this country at present. We might, perhaps, make laws designed to prevent girls picking up men on the streets and in other public places, but who believes that they would be enforced effectively in this country where the

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liberty of the subject is held in greater respect and defended more stoutly than in any other? Altogether, without prejudice to any subsidiary effort we may make towards the segregation and treatment of women who are flagrantly diseased and towards the improvement of conditions in our streets and public places, I think it would be a mistake to devote too much effort to preventive measures applied to women. I am sure that our greatest hope of exterminating venereal disease lies in the breaking of the chain at the male end, where the handicap is distinctly in our favour. A woman is probably infected by her first intercourse with a diseased man, because the conditions favouring infection—the protected situation in which the virus is placed—are ideal. In the case of a man it is quite different. On a conservative basis one could calculate that at least half the sexual intercourses of men out of wedlock are with diseased women; yet the highest proportion of infections to exposures has been put at 7·4 per cent. Personally, I think that, all the world over, 2 to 3 per cent. would be nearer the mark. Allowing, however, an all round risk from illicit intercourse of 7·4 per cent. and half the intercourses with diseased women, the risk of infection from intercourse with a diseased woman works out at about 6 to 1 against. As I mentioned, I think that the chances against infection are greater, but even a risk of one infection from seven illicit intercourses shows that natural agencies operate heavily against the gonococcus and the *Spirochæta pallida* when they are planted on the male genitals. The reason is not far to seek. The gonococcus and the *S. pallida* are the most delicate organisms in existence; they are planted on an exposed situation and easily liable to removal by urination or ordinary ablution. When natural agencies are assisted by the prompt application of antiseptics it can easily be proved that the chances of infection may be reduced to an infinitesimal amount. In support of this I should like to quote some statistics.

In the American Army men who contract venereal disease without having taken the precaution to be disinfected after exposure are punished; concealment of venereal disease is checked by frequent medical inspections. The result is that they are collecting most valuable evidence of the value of prompt disinfection. I am indebted to Colonel Walker, U.S.M.C., for the following two instances. In one group 2,426 exposures to venereal infection were dealt with by disinfection within an hour and a

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quarter of exposure and were followed by only two infections. At a 2 per cent. risk one would have expected forty-eight cases from this group.

In another group, for reasons which I need not detail, they experienced considerable trouble not only over the amount of promiscuous intercourse but over the neglect of the men to undergo subsequent disinfection. The exposures were easily 100 per cent. and the venereal rate was 720 per 1,000 per annum. Compulsory disinfection was introduced and every man who went out on pass was disinfected on return, whatever he might say about exposure whilst out on pass. In this group of 3,600 men the infections were reduced at once to 10 per 1,000 per annum.

The disinfection applied is this :—

(1) Thorough washing with soap and water; (2) washing with perchloride of mercury solution ; (3) injection into the urethra of 2 per cent. protargol or 10 per cent. argyrol, which has to be retained for three minutes; (4) inunction of the parts with 30 per cent. calomel ointment; (5) wrapping of the penis in toilet paper, which is kept on for four hours.

One of the most valuable illustrations of the comparative value of disinfection applied at different periods after exposure is this table published by Riggs, which you will find in Dr. Otto May's book on " The Prevention of Venereal Disease." It illustrates the experience at the Naval Station, Norfolk, Virginia, during the years 1915-17 and shows well, that to be effective, the disinfection must be prompt. You will notice that out of the 5,103 men who exposed themselves to infection 1,180 were treated within an hour, and only one lesion resulted. Even this seems to have been more of the nature of a chemical artefact than a venereal infection as the sore healed in a couple of days. As the period between exposure and disinfection increased the percentage of infections rose. The jump after four hours is particularly noticeable, and it is clear from this table that it is useless to wait for ten hours. The importance of promptitude over the disinfection has been proved also by the experience of the American Army in France, where Colonel Hugh Young[1] relates that in one battalion in which all-night passes were freely issued the venereal rate was three times as high as in a neighbouring battalion where men were required to be back

[1] Lieutenant-Colonel H. Young, U.S.M.C., the *Medical Bulletin*, published by the American Red Cross Society in France, May, 1918, p. 512.

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by night. In the first case there was, of course, a delay of several hours before the disinfection.

TABLE SHOWING THE EFFECT OF DISINFECTION AT VARYING PERIODS AFTER EXPOSURE TO VENEREAL INFECTION. (Experience, related by Riggs, at the Naval Station, Norfolk, Virginia.)

Number of hours after exposure when disinfection applied	Number of men disinfected	Number of infections	Per cent. of infections
1	1,180	1	0·08
2	1,172	7	0·59
3	521	4	0·77
4	330	2	0·61
5	199	3	1·57
6	321	5	1·58
7	277	6	2·27
8	390	16	4·22
9	283	10	3·62
10	214	11	5·14
More than 10	216	16	7·4
Total	5,103	81	1·58

The evidence from our own Armies is necessarily not so precise as that which I have just quoted owing to the difference of the conditions under which we are attacking this problem, but I should like to give two examples of the good effect of early disinfection which support the facts I have already related.

Major Falconer Brown, N.Z.M.C., who is in charge of the New Zealand Venereal Hospital, related to me the following: New Zealand ships bringing reinforcements to this country used to touch at Capetown and the men were allowed to go ashore fairly freely. The result was that each troopship used to land in England anything from fifteen to twenty cases of venereal disease. On one voyage Captain Mackenzie, the medical officer in charge, lectured the men particularly well on the importance of early disinfection after sexual intercourse. A large number of men took his advice as to the disinfection and he landed without a single case of venereal.

In the British Army it is only quite recently that disinfection has been taken at all seriously by the majority of medical officers. The system has now been re-organized and men may have on application to the medical officer or his orderly the means for disinfection after illicit intercourse. The means provided are:—

(1) A small bottle of 1 in 1,000 permanganate of potassium with which to swab the parts; (2) a small piece of cotton wool for use with the permanganate; (3) A small tin tube containing calomel cream in two consistencies. The first portion to ooze out

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when a pin is pushed through the nozzle of the tin capsule is semi-fluid and intended for injection into the urethra; the second portion is more solid and intended for inunction of the parts. The strength of calomel in both is the same—30 per cent.

Recently 2·5 per cent. thymol has been incorporated in the cream as our laboratory experiments appear to confirm the statement that thymol makes the ointment more bactericidal. The system has been in use for such a short time throughout the Army that results are rather meagre at present, but in one London barracks the calomel capsules have been used extensively for over two years (at first in conjunction with the voluntary irrigation with permanganate of potassium which we established in 1916 and have now abandoned) and, since April this year, without the irrigation. The experience is shown in this table, which gives the annual ratio of admissions for venereal disease per 1,000 per annum for the London District for 1913 (the last year for which it is available) and for this particular barracks for successive periods from January, 1916, to the present date. You will notice that, although the irrigation was abandoned in April, it seems to have made no very appreciable difference to the ratio.

Early Treatment (Voluntary).

Table Showing the Ratios per 1,000 per Annum of Admissions for Venereal Disease from (*a*) the London District in 1913 and from (*b*) — Barracks, London, during Successive Periods from January, 1916, to September 30, 1916.

Station and period	Ratio of admissions for venereal disease per 1,000 per annum	Remarks
London District, 1913 ..	95·6 ..	—
— Barracks, January to June, 1916	89 ..	Energetic early treatment campaign commenced in May, 1916
July to December, 1916 ..	37 ..	—
January to June, 1917 ..	52	—
July to December, 1917 ..	35	—
January to June, 1918 ..	44 ..	Voluntary irrigation abandoned, and reliance placed only on capsules from April, 1918
July to September 30, 1918 ..	42 ..	—

In a neighbouring barracks of about the same average strength in men the rate has by similar methods been reduced from 112 per 1,000 in the first half of 1916 to 50 per 1,000 during the last quarter. Absolutely, the rates are still high, but a comparison with the rates for the London District shows an enormous improvement in these two barracks, which total 2,000 to 3,000 troops. Most of the infections are now happening to men on leave, when means of

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early disinfection are not available. I do not need to say more to convince you that, in early disinfection, we have a most hopeful means of eradicating venereal disease. The ideal method is, undoubtedly, that in which the man submits himself to treatment by a skilled attendant within an hour of exposure. But promptitude is vitally necessary to success, and if the man is situated where he cannot obtain skilled assistance he should have the means of self-disinfection with him. I hope that before the Army is demobilized we shall have taught it by successful early treatment how to protect itself against venereal disease.

I should like now to consider a second line of defence which we have against the more prevalent of the two main venereal diseases—gonorrhœa.

It has been shown by numerous workers, that if a man will apply for treatment on the very first day of an attack of gonorrhœa, the disease can be aborted in 90 per cent. of cases in ten days or less. The means usually adopted consist in the injection into the urethra of solutions of such organic silver salts as argyrol, silver nucleinate, or protosil for a few days in succession. The Australian Medical Service have in this way saved some thousands of admissions to hospital for gonorrhœa, and the results which we have obtained at Rochester Row, though on a much smaller scale, substantiate the claims of other workers that, in the abortive treatment of gonorrhœa, we have a most valuable asset to our campaign against venereal disease.

Considering the success of the abortive treatment it is clear that, in those cases where men have delayed disinfecting for a number of hours after exposure, the best plan is to treat them by the abortive method, that is, to repeat the injections into the urethra for a few days in succession.

The next problem is the application of early and abortive treatment to the civil community. I do not think there should be great difficulty about providing the facilities if we can only make up our minds that it has to be done. In my earlier address I pointed out that, for the continued treatment of gonorrhœa, it would be necessary to provide subsidiary centres where men could go and irrigate themselves after being taught to do so at the central clinic, and women could be attended to by nurses, in each case following the prescription of the clinical medical officer. I suggested the plan of arrangement shown on this diagram. These subsidiary

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centres could perfectly easily be used for the early treatment and, if a junior medical officer or a dresser were in attendance night and day, the abortive treatment of gonorrhœa could also be carried out. It is not necessary to discuss here the details of procedure. So long as we are agreed on the main principles, the details are a simple problem.

I hope I have succeeded in convincing you that venereal disease is likely to prove a serious matter for the nation unless it is combated energetically, but that in the universal application of early and abortive treatment we have a medical means of eradicating it. To secure this universal application we must have the co-operation of the public, and it is the duty of the medical profession above all to secure this co-operation by education. The combating of venereal disease concerns everyone of us. It is useless simply to deplore the scandal and feebly wonder why somebody does not do something more to stop it. The something more will be done when a sufficiently large number of us have agreed on the main principles, stopped splitting straws over details and made up our minds that it *shall* be done.

THE ROYAL INSTITUTE OF PUBLIC HEALTH.

On Saturday, December 28, 1918, at the American Embassy, London, the Honorary Fellowship of The Royal Institute of Public Health was conferred upon the President of the United States, who subsequently signed the Roll of Honorary Fellows.

The Certificate was handed to Mr. Woodrow Wilson by the Principal, who was accompanied by Dr. T. N. Kelynack, Honorary Secretary.

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TOWN PLANNING IN ITS RELATION TO PUBLIC HEALTH.

BY

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A lecture (with lantern demonstrations) delivered at The Royal Institute of Public Health.

TOWN PLANNING, which, strictly speaking, means town development on considered lines, provides a basic solution to most of the problems incident to the administration of public health. The Housing, Town Planning, &c., Act, 1909, is the most comprehensive, and probably the most important, of all the Public Health Acts that have emanated from the Local Government Board. It may be true that this Act has not been made use of by local authorities to anything like the extent anticipated at the time of its initiation, but we must remember that town-planning procedure must necessarily be complex, lengthy, and involved, if towns are not to be the cast-iron aggregate of repeats that resulted from the more martial, though more easily administered Acts of 1890 and 1875. Moreover, we must remember that the Town Planning Act had barely entered the experimental stage of its practical application when we were plunged into this world upheaval, since when the opportunities of local authorities for furthering its progress have practically ceased. There has been sufficient experience, however, to prove that much of the procedure is unnecessarily cumbersome. Time and opportuuity has brought out the weak points in the Act, and there is no doubt that when the Act is amended, as undoubtedly it will be, town planning by Act of Parliament will rapidly be proceeded with again.

One of the greatest difficulties to be met with by those responsible for the administration of the Public Health Acts is that of the prevention of overcrowding, a difficulty that is very pertinent at the present time. Here a solution is found in the application of the principles of town planning.

Let us first then look somewhat closely into this question of overcrowding, and in referring to overcrowding I propose to confine my remarks to the overcrowding of houses and tenements

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on the land rather than to the overcrowding of their occupants within the interiors of same.

The overcrowding of English towns has been largely caused by two unfortunate episodes in their history: the one the introduction of manufactures into English villages, so early as the fourteenth century, without at the same time releasing some of that free and open land with which they were surrounded, in order to enable them with their rapidly increasing populations to expand; and the other, the rapid expansion of towns during the earlier half of the nineteenth century without at the same time any provision being made for dealing with the exceptional difficulties that arise in regard to sanitation where masses of houses are huddled together. Before the passing of the Act of 1875 no more thought seems to have been given to the question of refuse removal, nor to the need of light and air (in some cases so many as a thousand houses being crowded on to so confined a space as 100,000 square yards), than was previously given to the sanitary requirements of an isolated cottage on a bleak moor.

And so we get the mediæval slum and the later slum of the nineteenth century. We have already hinted at the way in which they originated, but their early beginnings and present condition are worthy of fuller consideration. At first sight it seems strange that English towns, which were less encumbered with walls than contemporary towns in other countries of Europe should have been equally congested.

The original cause of this, was no doubt the manorial land system and the consequent common ownership of land. If we examine the plan of any moderate-sized old village or small town, we find that it consists of a high street, and, possibly, a cross street, both of which are comparatively wide, and, fringing these main streets, a mass of densely packed houses intersected with narrow passages, and ending abruptly on land developed much later, or on open ground. This condition of town building was, no doubt, brought about by the difficulties of building upon land that was commonly owned. As the population increased, very often owing to the introduction of spinning and weaving, sites for additional cottages could only be found by building upon what was originally the curtilage of the tenements which abutted upon the main street. The conditions attached to ownership of land in an English mediæval village varied very much in different parts of the country

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and at different times, but one fact stands out very clearly that under the prevailing manorial system it was extremely difficult to obtain sites for building upon immediately outside the confines of the main street of the village or town. So that to-day as we pass along the high street of any county town, we find a continuous repetition of entries into narrow courts. Many of these narrow courts have been rebuilt over and over again, smaller ones have been absorbed and thrown together to form sites for modern building blocks, and others have been converted into the back premises of shops, into small warehouses, and into other buildings of the workshop and warehouse class. It is not so much in the centres of our older towns that the congested housing conditions exist as in that part of the main street which can boast of but a modest amount of reconstruction, and which is nearest to the boundaries of the town. The housing conditions found here in the larger of our old county towns are some of the worst existing in the country. In many cases there is a common yard often not more than six feet wide, the most primitive arrangements for sanitation, and very often the whole of the tenants of a court draw their water from one tap. It is not in the large and modern town that we find so many of these mediæval slums, but in the older and less enterprising county town.

But whilst the hygienic condition of this kind of slum is most deplorable, it is most tantalizing to find that usually it is the most picturesque and interesting section of the town. To make it sanitary, and the crowded cottages clean, healthy, and comfortable, is in most cases well nigh impossible. It is usually worn out, in which case the only satisfactory method of dealing with it is to remove it. But there are examples of such dating from the seventeenth and eighteenth centuries which are not only historically interesting, but in a tolerable state of preservation. Often by cutting out the worst, patching the best, and completely modernizing the sanitary system, interesting examples of early Georgian cottage architecture can be saved.

And now let us note the difference between this kind of slum and that other kind that resulted from the fœtid conditions of industrialism during the first half of the nineteenth century. Here, instead of building parallel rows of cottages separated from each other by passages that occasionally open out into courts, and where the back of one row is usually a blank wall forming the

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outlook and horizon of the windows to the cottages in the adjacent block; here, in the late eighteenth and nineteenth century slum, we find the back-to-back house the common type of development often containing a separate tenement on each floor. In general, they are either planned in solid blocks between two streets, the space between the streets being the depth of two back-to-back houses, or else they are built as a back-to-back surround to a large court, which, containing as it usually does a miscellaneous collection of separate wash-houses, closets, and other encumbrances, has the appearance of a miniature town in a state of chaotic disorder and decay. But perhaps the worst arrangement of all is that where back-to-back houses are built in rows which are solidly connected at intervals so as to form chains of narrow courts. Architecturally, the early nineteenth century slum is not devoid of proportion, and it has all the refinements of the period, such as pretty fanlights, well-panelled doors, often very beautiful architraves, and all the trimmings of a very refined period in the architectural history of the country; but more often than not the blocks, especially if they are late in their period, are absolutely bald and bare. There is, however, always a very clear distinction in the architectural refinement of the slum that was built prior to the passing of the Act of 1875, and those sanitary, but brutally vulgar, or dismally monotonous, terraces of houses erected later. There are very few manufacturing towns in this country which do not contain a certain number of insanitary dwellings of this early nineteenth century period. It is this type of slum that Liverpool has so largely cleared, and it is mostly this class of property that makes up the approximate 700,000 houses condemned as unfit for human occupation to-day.

It is, however, much easier to condemn a housing area than it is to re-habilitate the occupants. Generally speaking, it is the submerged tenth that live in this class of property. They are not habituated to the refinements even of bedrooms, to say nothing of a decent separation of the sexes, and a bath. Habituated to such conditions, they sleep, cook, and wash, huddled together in the hopeless untidiness often of one room. Small wonder that they care but little about keeping either themselves or their houses clean.

Here then is a problem that confronts the sanitary reformer and town planner, a problem that stands to my mind in the forefront of our after-the-war reconstruction scheme, and which

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demands the immediate and earnest attention of all who are interested in a national scheme of cottage building and housing reform.

What is the solution? The solution of so complex and difficult a problem is not to be found either solely in eviction, re-construction, improved habilitation, nor in the conversion of the unhappy slum dweller by an appeal to his moral rectitude through ethical doctrinaire. Like most problems which are intensely human, it requires in its solution a combination of effort and an interlocking of more than one method, and there is need for the services both of the medical officer of health, the sanitary inspector, the architect, and the town planner, to say nothing of the social and spiritual help of the clergy and the district visitor. Every single tenement in the mediæval slum is a complete problem in itself, as also is every block of tenements in the early nineteenth century poverty-stricken districts that have fallen into disrepute.

Briefly the powers of a local authority to deal with such matters are: (1) Compulsory powers to call upon the owner of any insanitary or dilapidated tenement to make it comply with the requirements of the local authority as to making it habitable. (Housing, Town Planning, &c., Act, 1909, Part I, Sec. 17.) In this connection the local authority may compel the owner to make to the tenant an allowance to meet the costs of his removal, and the local authority is not called upon to enter into any financial responsibility as regards such improvements. (2) Powers enabling the local authority where an improvement has not been made during a period of three months, and where in their opinion a house is unsafe, a nuisance, or a danger to the locality to order its demolition. (Same Act, Sec. 18.) (3) Power of a local authority to purchase large slum areas which in their opinion ought to be demolished, provision being made for the assessment of compensation by the Purchase Clause in Section 21 of the Act of 1890, compensation being based on the fair market value with deductions in respect of enhanced value being claimed on returns from overcrowding, also in respect of a bad state of repair of the property. (Act 1890, Sec. 4, and Act 1909, Sec. 22.) (4) Where the need is shown, powers to purchase land and erect houses. (Act 1909, Sec. 1, and Act 1890, Part III.)

So that it will be seen that there exists ample legal machinery for dealing with insanitary property, but except where an owner is

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called upon to put his property into a habitable condition, in every case the local authority has to pay. To clear a slum is expensive, and the clauses with regard to compensation take no account of the fact that the owner is parting with the possession of goods that have been shown to be injurious to society. Little wonder that but comparatively few improvements have been effected in this way.

This, then, is the legal and financial side. Let us now look at the more human side—the capacity of the occupants of slums for living in improved conditions. It is perhaps as difficult in slum reform to improve the habits of the people as it is to improve their homes. To evict the denizens of a disreputable area, and pull down their lair, is certainly a concrete improvement, but it is not that complete improvement which aims at uplifting the submerged tenth in the town. In my own experience I have come across cottages which are in the last stages of decay, and whose tenants living in crowded conditions, are beset with all the difficulties that are met with in having to perform all household operations in the confines of one room, and that room possibly not having seen paint or paper for many a long day. I have seen such cases where the tenant, imbued with a deep-rooted sense of respectability, can claim to have acquired habits of cleanliness which no amount of inconvenience in the household arrangements can belie; and then, on the other hand, there are tenants who really prefer the disorderly existence into which they have been born, and amidst which they have been brought up to the discipline that they would be called upon to exercise, and that it would be difficult for them to refrain from practising were they housed under more favourable conditions and were they the tenants of an up-to-date cottage, when they would be marked as responsible citizens in the eyes of all around.

Now it occurs to me that between the slum areas as we find them in almost every town and the housing scheme that it is proposed to erect say where land is available as nearly as possible within the boundaries of the city, what almost every town will need and should erect is a type of intermediary dwellings as close as possible to, if not on the very site of the cleared out slum. It is useless to expect the class of tenants that have occupied these slums to clear out and occupy the garden cities that will be erected outside the town. They have not the courage nor the inclination, even if they had the means. The sort of housing scheme I would

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advocate would be one in which a certain amount of control could be kept over the occupants in respect of washing floors, cleaning windows, limitation of occupants, particular use of rooms and fittings, and other matters, which whilst initiating the lowest type of slum dweller in the mysteries of restraint and discipline, and so gradually qualifying him and his children for a higher and more independent way of living, would in reality be houses of detention and correction, so far as the moral welfare of the worst type of slum dweller was concerned.

Liverpool has worked very much on these lines and the experience of Liverpool proves conclusively that where clearance goes hand in hand with housing, and where controlled tenements are provided for the dispossessed, the old tenants who occupy the new tenements will rapidly reform. Mr. Turton, the Deputy Surveyor to the Liverpool Corporation, speaking at a Conference in Liverpool in the year 1914 in this connection, said that: "In 1864 in Liverpool there were 22,000 insanitary houses which were back to back, side to side, with conveniences perhaps for every twelve houses. The present position of these houses is that by the operations of the Corporation, and the operation of private individuals, who have pulled down houses for their own benefit, the number of insanitary houses has been reduced to 2,771. The people displaced went into other houses—they went into single rooms in large houses which had occupied a good position in the city at one time; they went into cellars, and it is almost certain that some went into the workhouse, and so came to be living in conditions almost as bad as before. This state of affairs became so acute that considerable agitation took place for its abolition. It caused in the first place great displacement of the population, great interference with schools, churches and places of worship, and also shopkeepers. The whole thing came to be regarded as something of a scandal." Mr. Turton then explained how after much agitation it was finally agreed in 1897 that they would embark on a housing scheme but would only house the dispossessed. The sort of accommodation provided was for the very poorest, two-roomed tenements in four-storey buildings at rents of from 3s. 6d. on the ground floor to 2s. 6d. on the fourth floor, and for those who could afford a little more, three-roomed tenements ranging from 4s. 6d. on the ground floor to 3s. 6d. on the third floor. In regard to the finance of all this, Mr. Turton explains

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that up to the end of the year 1913, and taking in all the demolition that had been done since 1864, the total amount expended by the Corporation was £1,163,465. The debt had been reduced to £743,600. The cost per annum for interest and sinking fund after deducting the net rents from the dwellings is £34,231, which is equal to a rate of about 2¼d. in the pound, and that as the sinking fund is paid for out of this money, those who come after us will come into a valuable estate which will probably yield something like £20,000 a year. And finally he says, "improvement in the habits of the people has been most marked. There is a higher moral tone, a stronger regard for self-respect, and above all a greater love of home is evident in the people residing in the Corporation dwellings." It is unnecessary for me to supplement these conclusions by quoting the statistics he gave showing the marked improvement in the death-rate and the simplifying of the work of the police. The experience of Liverpool is unique, and I quote it fully in order that I may show from the actual experience of Liverpool, that it is necessary to provide an intermediary house of detention, a stepping-stone between the insanitary tenement and the cottage in the garden suburb outside the town. These cottages will naturally be occupied by the cream of the lower class, who are to-day crowded in the by-law terrace houses that were erected but a very few years ago. And what I particularly wish to emphasize is this, that in the enthusiasm for the provision of more houses, the need for which is described by the President of the Local Government Board as being more urgent than that of any other constructive reform, we are apt to concentrate our attention too exclusively upon garden suburbs to the neglect of housing problems that affect slum demolition and the lowest grade of the population. I do not contend that grants in aid should be devoted to the sort of housing reform that has been carried out in Liverpool. Every city has its own individual troubles which it is up to that city to rectify, and whilst the subsidies that are to be granted to local authorities towards the expenses of immediately providing more houses for the working classes will be largely devoted to erecting cottages in suburbs laid out on garden city lines, and for the occupation of able artisans now in lodgings and crowded in respectable houses, at the same time it is hoped that a certain proportion of these funds will be devoted to the erection of an intermediary urban type of dwelling, if not to the actual clearance of a slum.

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It will no doubt be contended that the intermediary urban type of dwelling referred to, will perforce be the by-law terrace vacated by a class who will move one up into the garden city. This is so in regard to the best of the tenants now obliged to live under unhealthy conditions in slum areas. But there is a large residue who can only be dealt with and adequately captured and controlled by housing them in healthy communal dwellings on the precincts of their demolished hovels.

Now I think it will be generally agreed that town planning or a considered appreciation of the relative values of, and interrelation between the different grades and types of housing in a city, is an essential study in connection with municipal housing and in the interest of public health. But there are other aspects where town planning and housing as a study can be very helpful in the administration of public health. I refer to the considered planning of groups of cottages and the advantages that can be secured thereby in the provision of more air space, more garden ground, cheaper roads, more economic methods for the disposal of sewage and refuse, and in the general economic working of a small house. Here not only can the town planner be of some assistance to the medical officer of health, but the medical officer of health can be of very great assistance to the town planner.

Recently there has been a very pronounced rise in what may be regarded as minimum needs and accommodation in the arrangements of a cottage, in the interests of comfort, decency, and health. It is generally accepted, for instance, that no cottage should be built which does not provide in its accommodation three bedrooms, and in its equipment a bath. In principle, practically everyone is in agreement as to this, but points which are controversial are such as relate to the method of refuse removal, the outside water closet and the upstairs bath. Here controversy naturally wanders around that delicate question, the status of refinement to be expected of the working man. I hesitate lest I labour the point unnecessarily, but it is important in planning a cottage to remember that it is intended for an occupant who for, at any rate, during the greater portion of his time, will be engaged in manual labour, and whom we should regard as being robust both in body and mind.

I would be the last to deprive the working man of those modern contrivances for saving labour in the cottage, and of those conveniences of which he has so long been deprived, but when we

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come to consider such questions of pseudo-respectability as that of the propriety of cooking in the living room, or the necessity of constructing back passages merely to obviate the possibility of having to undertake the indelicate operation of carrying the dust twice a week from outside the scullery door across the living-room to the dust cart in the road, surely it is time to consider whether the working-man ought not to wear gloves and a starched collar, someone else being found to do that manual work which his muscular body is supposed to have made him so well fitted for. No, in considering the needs of the occupant of a cottage let us beware of confusing questions of decency, health, cleanliness, comfort and economy, with that other so much misused term, respectability.

With this introduction to the more intimate details of town planning and housing, let us now proceed to consider whether in the cottage of the future and the tenement of the working man it is feasible to introduce more scientific methods in building new labour-saving contrivances, and more highly organized methods in the administration of public services, especially such as can be helped and encouraged by town planning.

With regard to the adoption of improved methods in building, my own view is that at the present moment there are at hand so many economic proposals, some of them constructional, some of them labour-saving, and some of them guaranteed to dispense with about half the material usually employed, that there is no need to search for further methods. We have before us hundreds of different methods in concrete construction alone, some of them tried and shown to be successful, and others that have not yet passed through their experimental stage. It is much the same as regards roofing and flooring; we are really confused with an exuberance of choice.

In a national scheme of cottage building such as we are faced with to-day, it is not a question of discovering new and better materials, but rather of organizing, standardizing, and repeating almost any one of the many excellent methods of building construction that have already been introduced and that have proved satisfactory in every way. Usually a super-skilful method of building construction will not prove economic unless applied in a very extensive way and unless the Government intervenes and makes it a condition of lending money that some special system of

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construction be adopted—which it is not likely to—or unless some big firm or combine, like the Ford organization in motor cars, take up some speciality in building construction and push it with a vast organization, I do not think that we shall see any very great advance on the old 9-inch brick wall, which in the interests of economy, if for no other reason, seems a pity.

Let me now refer to some of those points that relate to the comfort and convenience of the occupant of the cottage. First then, as regards the bath, its placing, and its water supply. I am more than ever convinced that no cottage should be without its bath. I am further convinced that the bath should be planned in a separate room, and I am more than persuaded that in the case of a cottage with a parlour, at any rate, the bath-room should be placed near the bedrooms on the first floor.

Without going into the question of central heating in a village as well as in a town which is bound to come one day, I would point out that even under present conditions there is no difficulty in installing a hot water system into a cottage, and no great expense need be incurred provided a standardized system be adopted and a few thousand cottages be supplied with hot water in the same way. The best system is to supply the hot water directly from a boiler at the back of the kitchen range, dispensing with the usual storage cylinder, which, necessary in a middle class house where much more hot water is needed, is not necessary in a cottage. As to whether the bath is in the scullery or on the first floor is immaterial. In the former case there would be an automatic valve at the level of the water in the boiler which would be allowed to rise to within 2 in. of a hinged lid in the chimney, and in the latter case there would be an automatic valve above the level of the bath, and the usual expansion pipe from the boiler off which the hot water would be drawn. The boiler in this case would, of course, be a closed boiler.

But sooner or later these methods will be superseded by central systems of heating, and of such I am inclined to think that the most practical and economical will be that of heating by gas. It is hoped that after the war an effort will be made to stop the trucking of coal and to convert it into gas for heating and electric lighting at the pit's mouth.

Gas generated in this way and driven through mains, should be sold in the towns so low as sixpence a thousand cubic feet. What

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prevents the lower class, and indeed, the middle class from using gas for cooking and heating to-day as a universal system is its cost. I know of many cases where gas boilers for washing clothes have been introduced into cottages, but they have in some cases been removed and in others they are not used owing entirely to expense in working.

What we want to aim at in the cottage is gas at sixpence a thousand, and a really reliable gas hot-water generator, with an automatic control that will ensure a constant supply of hot water. And it goes without saying that with gas at this price there will be gas cooking. As regards gas fires, it is a question if the last invention has yet been introduced to the public for transmitting heat through a gas fire. There is something very fierce and bitter about a gas fire, without at the same time it being very warm. The heat from a gas fire being radiant seems to penetrate and pass through, it seems to burn without warming, and in every way as we have it at present it is not nearly so comforting as a coal fire. Neither is it so interesting, perhaps the mere interest in change and movement in the coal fire is its greatest attraction. However that may be, there is a great opportunity for the inventor of gas appliances to produce a gas fire that will have more of the warming qualities that we regard as so peculiarly delightful in a coal fire.

I shall conclude by saying one word about the back passage. No question in cottage planning is the subject of so much controversy and difference of opinion. In the London district the back passage is not known. In most provincial towns, and especially in the North it is regarded as imperative. In itself it is an expensive and usually very objectionable incident in a town. It is the more necessary where coal is delivered, not in bags but in bulk. It is also more necessary in those districts where the local authority can only afford to remove the refuse from the houses at intervals of say a week. It is also necessary where there are gardens for the delivery of soils and manure, though its use in this way probably takes place not more than once or twice in a year. Now, I consider that we ought to reduce back passages to a few grass approaches perhaps the width of a wheelbarrow for access to the gardens, for the distribution of manure. The removal of refuse can everywhere be undertaken through the terrace house, in the same way as it is and has been done in London in living memory. Decency and sanitation only depends here upon its frequent

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removal, and upon the care which is taken to keep the dust bin clean. As for the coal delivery, it must either be taken in sacks through the living room and emptied into a coal place off the scullery or, better still, why not revive the coal cellar under the front stair, pop the coal down a coal shoot outside the front door and use it from a door in the scullery which opens on to a few steps to the coal cellar which would be under the cottage stair and 3 or 4 ft. below the ground floor.

But, as I have already pointed out, almost all the economies that can be effected in cottage building and cottage working, and all the improvements that can be introduced in the way of cheapening and facilitating the use of gas, electric light and other services, all of which are eminently conducive to an improved standard of public health, depend almost entirely upon national and municipal organization, which means town planning and town development in its best sense and in its broadest way.

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Chemical Notes.

BY
ALAN W. STEWART, D.Sc., A.I.C.
Demonstrator of Chemistry in The Royal Institute of Public Health.

Estimation of Shell in Cocoa and Cocoa Products (J. L. Baker and H. F. Hulton, *Analyst*, 43, p. 197).—The introduction of the Cocoa Powder Order, 1918, renders it necessary to estimate the percentage of shell in cocoa powders. By this Order no cocoa may be manufactured which contains more than 5 per cent. of cocoa-bean shell, and which contains not less than 22½ and not more than 30 per cent. of cocoa butter. This is known as Grade B powder, and the maximum retail price is 2s. 2d. per lb. or 2s. 6d. if sold packed in cartons. Grade A powder must not contain more than 2 per cent. of shell, and the maximum retail price is 3s. 2d. per lb.

(1) *The Levigation Process.*—10 grm. of the finely ground powder are extracted with ether for twenty-four hours in a Soxhlet apparatus. The thimble is exposed to the air to remove the ether, dried in the water-oven and the contents well ground in a mortar, then stirred into a thin paste with water. It is then transferred with washing to a 500 c.c. cylinder. The volume in this is made up to 400 c.c., the whole inverted a few times. An arrangement for blowing off the supernatant liquid is inserted into the neck; the leading tube should be turned up at the lower end to avoid disturbing the sediment. The contents in the cylinder are allowed to settle for fifteen minutes, then the liquid is blown off. The volume is again made up to 400 c.c. with water and the above procedure repeated after ten minutes, and again after two periods of five minutes' stand. The residual sediment is transferred to a platinum basin: evaporate, dry, and weigh. The ash obtained from this residue is then deducted. The percentage of shell in the original sample is calculated from the formula:—

$$S = \left[\frac{100\,M}{100 - (F + W)}\right] - 3 \times \frac{100 - F + W}{27}$$

Where S = percentage of shell in sample, M = percentage of ash-free levigation sediment in sample, F = percentage of fat, W = percentage of water. In this method it is difficult to get results agreeing within 1 per cent.: the differences are usually about 2 per cent.

(2) *The Fibre Process.*—The fibre estimation is carried out on the defatted material, using 1·25 per cent. acid and alkali. The fibre is weighed, incinerated, and the ash deducted. The percentage of shell in the sample is calculated from the formula:—

$$S = \left[\frac{K \times 100}{100 - (F + W)} - 5{\cdot}7\right] \times \frac{100 - (F + W)}{11{\cdot}1}$$

Where K = percentage of fibre, the other constants are as before.

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(3) *The Nitrogen Process.*—The percentage of nitrogen is estimated by the Kjeldahl-Gunning method on 1 grm. of sample. The percentage of shell is calculated from the formula:—

$$S = 2{\cdot}17\ [100 - (F + W)] - \frac{100\ N.}{2{\cdot}26}$$

Where N = percentage of nitrogen in sample, the other constants are as before. The authors find that the available methods are quite inadequate for separating Grades A and B; but when the shell is present in considerable proportions fairly satisfactory results can be obtained. The method of estimating shell in cocoa products is, however, now receiving official consideration.

Analysis of Commercial Saccharin (H. D. Richmond and C. A. Hill, *Journ. Soc. Chem. Indust.*, 37, p. 246).—The author's method for estimating the amount of orthobenzoylsulphonimide consists in hydrolyzing it to *o*-sulphonaminobenzoic acid by boiling with alkali, and this is then converted into the ammonium salt by boiling with acid. The following is the method: 0·6104 grm. of saccharin is treated with 10 c.c. of 30 per cent. NaOH and the solution boiled for two minutes, taking care not to concentrate the liquid appreciably. The product is then treated with 15 c.c. of concentrated HCl and boiled under a reflux condenser for fifty minutes. NaCl should not be deposited whilst the liquid is boiled. The solution is next cooled and diluted with 75 c.c. of water and a current of air is passed through the upper part of the flask to remove acid vapours; add 15 c.c. of 30 per cent. of NaOH carefully and connect up with a distillation apparatus and receive the distillate into a flask containing 40 c.c. of N/10 HCl. Titrate back with N/10 alkali to methyl red. Do a blank experiment with the reagents. The number of cubic centimetres of N/10 acid neutralized multiplied by 3 gives the percentage of saccharin. This method gives on an average about 0·1 per cent. too high. The common impurities are para-benzoylsulphonimide and ortho-toluenesulphonamide.

The Detection of Cane Sugar in Milk (G. D. Elsdon, *Analyst*, 43, p. 292).—(1) To 10 c.c. milk add 2 c.c. of saturated ammonium molybdate solution and 8 c.c. of HCl (1 in 8); raise the temperature gradually to 80° C. and maintain it for five minutes. A blue colour denotes cane sugar. (2) 1 c.c. of 3N hydrochloric acid and 0·5 grm. of resorcinol are added to 15 c.c. of milk. Five drops of the mixture are placed in one of the depressions of a white spot tile. Place on boiling water-bath to dry. A red coloration indicates cane sugar. This test will detect 0·02 per cent. of cane sugar.

Test for Osmium (L. Tschugaeff, *Compt. rend.*, 167, p. 235).—If the solution is heated with an excess of thiourea and a few drops of hydrochloric acid, a rose to deep red coloration is obtained according to the

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amount of osmium present. By this test it is claimed 1 in 100,000 can be detected.

Test for Hypochlorites in drinking Waters (A. R. Ling, *Analyst*, 43, p. 347).—Hypochlorites are used extensively in water purification and it has been noticed that such waters frequently give high figures for the saline and albuminoid ammonia tests. This is due to the fact that the ammonia and amino compounds have been converted into chloramine and chloramino derivatives respectively. In order to ascertain the presence of a hypochlorite take 50 c.c. of the water and a similar amount of distilled water and place each in a separate Nessler glass; to each add 1 c.c. of normal sulphuric acid and 0·1 grm. of potassium iodide. If hypochlorite is present a brown colour of liberated iodine appears whilst the distilled water remains colourless. It must, however, be remembered that nitrites, which would be oxidized by the hypochlorite treatment, liberate iodine.

Estimation of the Acidity of Condensed Milk (M. Dujardin, *Ann. Chim.*, 23, p. 83).—10 grm. of the sample are treated with 25 c.c. of warm CO_2-free water and the solution is titrated with N/10 NaOH to phenolphthalein. Calculate to lactic acid per cent. In fresh sweetened, unsweetened, or skimmed condensed milk, the author finds that the acidity should not exceed 0·5 per cent. From 0·5 to 0·75 per cent. would represent a doubtful quality and exceeding 0·75 per cent. indicates the milk is unfit for consumption.

The rapid Destruction of Organic Matter (P. Duret, *Compt. rend.*, 167, p. 129).—The substance is mixed with 10 per cent. sulphuric acid, add 20 grm. ammonium persulphate and heat the mixture to boiling. When the gases have ceased to come off add more persulphate and continue the heating, and repeat these operations till the liquid is colourless. Concentrate, cool and dissolve the crystalline mass in water. For 100 c.c. urine, 10 c.c. conc. H_2SO_4 and 40 grm. persulphate are required and the oxidization requires about half an hour.

Estimation of Albuminoid Ammonia in Liquids containing Gas Liquor (H. F. Stephenson, *Analyst*, 43, p. 213).—To a measured amount of the water, which should be alkaline, add enough aluminium sulphate to give a marked precipitate; shake and allow to stand for a few minutes. Collect the precipitate, with the aid of a pump, on an ignited asbestos filter, and reserve it. The clear filtrate is acidified with dilute nitric acid and the thiocyanate is precipitated with silver nitrate and the latter can be recovered by adding sodium chloride. Transfer the final clear filtrate, together with the asbestos filter and its precipitate, to the ammonia distillation apparatus, render alkaline with sodium carbonate and estimate the albuminoid ammonia as usual. The results obtained are slightly higher than the true figures.

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Bacteriological Notes.

BY

J. H. JOHNSTON, M.Sc.

Demonstrator of Bacteriology in The Royal Institute of Public Health.

PRESERVATION OF BIOLOGICAL PRODUCTS FROM CONTAMINATION (United States Government Hygiene Laboratory, *Bulletin* No. 112, 1918).—This report contains a series of four papers dealing with the preservation of biological products to be used for injection, such as immune sera and vaccines, and with the contaminations occasionally found in them. The treatment of acute lobar pneumonia with a specific serum is becoming more general. The serum is prepared by injecting horses with dead cultures of the pneumococcus, and is preserved by the addition of 0·3 to 0·5 per cent. of phenol or cresol. Doses of 50 to 100 c.c. are given intravenously at intervals of six to eight hours, so that a considerable amount of phenol is introduced into the blood stream in the course of twenty-four hours. Animal experiments showed that this amount of phenol produced no toxic symptoms. It is recommended, however, that the injection should be made at a slow rate in order to avoid more than a trivial fall of blood pressure. Occasionally biological products are found not to be sterile. These cases have been investigated, and the organisms present were *Staphylococcus albus* and *aureus*, streptococci, coccoid bacilli, spore-bearing bacilli, and one anaerobic bacillus. These were found in tetanus anti-toxin, anti-meningococcus serum, rabies vaccine, anti-pneumococcic serum, small-pox vaccine, diphtheria antitoxin, and bacterial vaccines. The organisms were mainly saprophytic, though in a few cases species pathogenic to rabbits and mice were found. Many of the cocci and coccoid bacilli were submitted to the action of solutions of phenol, 1 in 110, and formalin, 1 in 50, and these substances were found to be ineffective germicides. In the preparation of vaccine virus, treatment with ether has been recommended in order to reduce the number of living bacteria. The effect of this treatment on tetanus spores was investigated, and it was found that even under the most favourable conditions ether failed to kill them. This report demonstrates the scrupulous care which must be exercised in the preparation of these products for the market.

THE DETECTION OF THE *Bacillus botulinus* IN PRESERVED FOODS BY THE PRECIPITIN REACTION (M. Bernand, *Bull. Agric. Intelligence*, 1918, p. 1113).—Tins of preserved meat, fish and vegetables were inoculated with a culture of the *B. botulinus* and resealed. After five months they were opened again, when there was a strong smell of butyric acid,

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and bacteriological examination showed the presence of living botulinus bacilli. Advantage was taken of Ascoli's thermo-precipitin method for the detection of the precipitin. Five grammes of each specimen were added to normal saline solution and boiled in a water-bath for five minutes. The solution was then cooled and filtered, and the filtrate added to a botulinus anti-serum prepared by inoculation of a rabbit, when a zone of precipitation occurred with the meat and fish, but not with the vegetables. Specimens of the same foods from uninoculated tins gave no precipitin reaction. The anti-serum used was found to be specific for the *B. botulinus*.

Separation of Trypanosomes from Blood in Antigen Preparation (F. H. Reynolds and H. W. Schoening, *Journ. Agricultural Research*, 1918, p. 573).—At present the methods employed in recovering trypanosomes from the blood of artificially infected rats, though satisfactory, have presented features somewhat detrimental to the antigen prepared, and which, if overcome, would greatly improve the purity of the antigen and therefore its specificity. It is usual to centrifuge the blood repeatedly until the corpuscles and trypanosomes are separated. But many of the trypanosomes go down with the corpuscles and some of the red cells remain with the trypanosomes in the liquid. Also the method is lengthy.

In the method proposed by the authors the blood of inoculated rats is collected in citrated saline and then strained through muslin and centrifuged for twenty minutes at 2,000 revolutions. The clear liquid is drawn off and centrifuged again to recover any trypanosomes present. The first deposit consisting of corpuscles and trypanosomes is agitated with distilled water for twenty minutes until the red cells are completely laked. The liquid is then centrifuged for half an hour when the trypanosomes are all collected at the bottom of the tube. The liquid is poured off and the deposit is washed with saline and centrifuged. The saline is rejected and a preserving fluid consisting of glycerine and saline is added to the trypanosomes, and the mixture is stirred well to produce a uniform emulsion. This is stored on ice.

Comparative tests were made of the antigen prepared by the new method and one prepared by the present method. It was found that the use of distilled water to lake the corpuscles had had no detrimental effect on the trypanosomes with regard to their antigenic value, and that their anticomplementary action was diminished. The new method has the advantage that all the trypanosomes in the blood are recovered, and that the antigen is free from any erythrocytes and its keeping qualities are improved.

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Reviews.

Practical Organic and Bio-chemistry. By R. H. A. Plimmer, D.Sc. London, 1918: Longmans, Green and Co. Pp. 636. Price 18s.

The second edition of this well-known work is arranged on the same plan as its predecessor and no alteration has been made in the general scope of the book. There are also comparatively few changes and additions; the text has been well revised and new methods of preparation and analysis have been incorporated. Although intended chiefly for medical students, it contains the essentials for all students of biology and as the chemistry of organic bodies met with in plants as well as animals is dealt with, medical men will obtain a wider outlook and a deeper insight into the wonderful substances connected with the phenomena of life. The essentials of the subject are printed in large type, whilst the botanical and more advanced portions are printed in small type. The more important practical experiments suitable for a preliminary course are indicated by asterisks. The sections dealing with the analysis of urine, blood, muscle and other tissues are particularly well written and deserving of special attention. The list of special reagents given at the end of the book will be found very useful and help to bring about a much needed standardization amongst different workers. The arrangement of the subject matter and the illustrations and general style are excellent and there is a copious index. We can recommend this book to medical students, biologists and other research workers.

The Chemistry of Synthetic Drugs. By Percy May, D.Sc., F.I.C. Second Edition. London, 1918: Longmans, Green and Co. Pp. 250. Price 10s. 6d.

In the second edition of this book the author has revised and enlarged the subject matter. He gives an interesting and full account of the main facts concerning the chemical nature of synthetic drugs and the fundamental principles used in their production. The author does not merely describe the various products but he gives much information of a physiological and bio-chemical nature. The text-matter is well arranged and the chapters on the compounds of arsenic and antimony, and adrenalin are deserving of special mention. The information given is accurate and the latest facts and researches are stated. Before the war, the manufacture of synthetic drugs was practically confined to Germany, but since 1914 much progress has been made here, and it is satisfactory to know that these synthetic organic chemicals can be made successfully in this country. The manufacture of these presents many difficult problems and it will be probably necessary to give some form of protection to this important growing industry for some years after the conclusion of peace, if we are to hold our own against the vast and highly organized German industry. This book is published at an opportune time and it should act as a powerful stimulus to the British synthetic drug industry. All chemists engaged in this work will find Dr. May's volume a most useful guide and help on this subject, and we can cordially recommend it.

Amputation Stumps: Their Care and After-treatment. By G. Martin Huggins, F.R.C.S. London, 1918: Henry Frowde, Hodder and Stoughton. Pp. 228. Price 7s. 6d.

This handy little book is written for the information of the large number of surgeons engaged in the treatment of cases in which amputation has been performed. It is one of the most valuable of the smaller contributions which have been made towards the problems of war surgery. It deals with the physiology, pathology and treatment of stumps, and links the work of the surgeon with that of the mechanician supplying the artificial limb. The subject matter is divided

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into seven chapters, of which three are devoted to stumps, two to general and miscellaneous considerations, one to sinuses and necrosis of bone, and the final one to joint deformities. The Furneaux Jordan amputation is rightly condemned by the author; regarding Syme's amputation, he is of opinion that a Syme's stump, which is not entirely end-bearing, is inferior for functional purposes to an amputation through the leg. The text is well printed, and praise is due to the publishers for the numerous and excellent illustrations, which much enhance the value of this addition to the Oxford War Primers. This book should be widely read; its advice and surgical teaching rest on a sound basis. We can cordially recommend it to all surgeons called upon to perform primary amputations or to improve the results of them later on; operating surgeons in France will find it invaluable.

Applied Anatomy. By Professor Gwilym G. Davis, M.D., M.R.C.S. Philadelphia and London, 1918: J. B. Lippincott Co. Fifth Edition. Pp. 630. Price 30s.

The popularity and utility of this standard work is still unabating, as this is now the fifth edition during the past eight years. It is easy to see from a perusal of it that numerous corrections and additions have been made both to the cuts and text. The object of the writer is not merely to teach plain anatomical facts but to show the relation of structure to function whether normal, disturbed or impaired by injury or disease. There is ample evidence to show that this treatise is explanatory and utilitarian in character and not encyclopædic. As regards the anatomical nomenclature as much of the B. N. A. terminology has been used as practicable. In considering the subject the skeleton and muscles are briefly described, followed by surface anatomy. The various affections of the part are then dealt with. The author does not claim that this work is a complete anatomical treatise; it is suggestive rather than absolute, and is not designed so much to present facts as to furnish reasons. It is well printed on glazed paper and the 630 illustrations are particularly good, most of them being from original dissections and many are splendidly coloured. Much credit is due to the artist and publishers. We can confidently recommend this excellent treatise to practising physicians and surgeons as well as to students of medicine.

English, French, Italian Medical Vocabulary.—By Joseph Marie. Philadelphia, 1918: P. Blakiston's Son and Co. Pp. 112. Price 50 cents.

This little book contains about 5,000 medical words in frequent use in Europe; they have been selected from modern works on surgery, sanitation, nursing. Much useful information is given on directions for first-aid to the injured, money tables, weights and measures, thermometrical tables, French and Italian pronunciation, abbbreviations, &c. Most of the terms will not be found in the ordinary dictionary, and the author has rendered considerable service in compiling this neat and pocket-size book. It will prove very useful to doctors, Red Cross nurses, and all engaged in work of this nature, more especially in France and Italy.

NOTICE TO FELLOWS AND MEMBERS.

The title page and index of vol. xxvi. of THE JOURNAL OF STATE MEDICINE for the year 1918 will be forwarded on application to the Secretary of the Institute, 37, Russell Square, W.C. 1.

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Volume XXVII. FEBRUARY, 1919. No. 2.

ANTHROPOMETRY AND NATIONAL HEALTH.

BY

PROFESSOR ARTHUR KEITH, M.D., F.R.S.

Ex-President of the Royal Anthropological Institute.

A Lecture delivered at The Royal Institute of Public Health.

MR. LLOYD GEORGE never rendered a greater service to public health than when he insisted in his speech at Manchester on September 12, 1918, that the physical condition and health of the population must receive the immediate attention of the Government. "We have done great things," he said "in this war. We would have accomplished greater if this country had been in condition; and a war, like sickness, lays bare the weakness of a constitution. What has been our weakness? Let us talk quite frankly. We have had a Ministry of National Service and carefully compiled statistics of the health of the people between the ages of 18 and 42. . . . All I can tell you is that the results of those examinations are startling and I do not mind using the word appalling. I hardly dare tell you the results. . . . I asked the Minister of National Service how many more men we could have put into the fighting ranks if the health of the country had been properly looked after. I staggered at the reply. It was a considered reply and it was 'At least one million.'"

The disagreeable but important subject of physical deterioration which the Prime Minister thus forced on the attention of his Manchester audience, is one which a small group of private citizens has vainly endeavoured these sixteen years past to press upon the attention of the Government. We need not go back to last century and cite the investigations made by the Factory Commissioners of 1833, the Local Government Reports on "Proposed Changes in Hours and Ages of Employment in Textile Factories," or the inquiries of the Anthropometric Committee which published the results of its inquiries between 1878-83. The statistics collected by these bodies showed that the conditions under which people lived did have a very decided influence on the development of their bodies and the condition of their health. The first man to succeed in rousing men to the importance of the problem of physical

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deterioration was the late General Sir Frederick Maurice. In the *Contemporary Review* of January, 1902, General Maurice made the statement that of the men who offered themselves as recruits during one phase of the Boer War, only two out of five became effective soldiers. Putting the matter in another way, a battalion of 1,000 possible recruits—ten companies of 100 men each—lost six companies before it appeared on the field of battle. The potential battalion of 1,000 men was reduced to one of 400 men by the time it passed into action. He was of opinion that "the great body of the nation is decaying in health and physical vigour." An examination of the recruiting statistics from 1893 to 1901, including a total of 679,703 men, gave the assurance that although the condition of the men who offered themselves as recruits was unsatisfactory it was not so bad as General Maurice had pictured. Rather more than 3½ companies were lost to each battalion on account of physical unfitness. As the result of these revelations by the recruiting authority and because of other discoveries made by the Royal Commission appointed in 1902 to ascertain the need of introducing physical training in the schools of Scotland, an Interdepartmental Committee was constituted in 1903 to advise the Government as to whether or not the physique of the people was deteriorating as was being alleged. The Committee reported in 1904 that the evidence was equivocal and that the matter could be settled only by an anthropometric survey. A scheme for making such a survey was outlined—the machinery proposed being very similar to that of the Geological Survey. The recommendations of the Committee, in spite of pressure brought to bear on the Government by the Royal Anthropological Institute and British Association, were never acted on. As a matter of fact the scheme would have proved unworkable, because in 1904 there was no section of the population or area of the country that would have submitted to a compulsory physical examination.

Thus, all efforts to obtain a physical survey of the people in the opening years of the present century failed. But, as Mr. Lloyd George has said, war is a schoolmaster—a costly schoolmaster—and the survey which we refused to carry out in peace time was forced upon us by the exigencies of war. The introduction of compulsory military service in 1915 entailed a survey of the manhood of the country, while the Act of 1908 gave the Board of Education the power to carry out a medical inspection of school children. Thus,

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these two Acts of Parliament led to the setting up of machinery by which a physical survey of a large part of the population could be carried out—such as early enthusiasts like the late Professor D. J. Cunningham and the late Mr. John Gray had urged in vain on the Governments of their day. Anthropologists again took the matter up in 1916. In March of that year the leading scientific societies in the United Kingdom met under the ægis of the Royal Society to form a "Conjoint Board" to advise Government Departments on all questions in which advice was required on matters of a scientific nature. One of the first Acts of this newly-formed Conjoint Board was to appoint an Anthropological Survey Committee. The Committee thus appointed recommended that a survey of the physical condition of the people should be made by the various Government Departments concerned, namely, the Ministry of National Service, the Board of Education, and the Home Office. The Committee also made another important suggestion, namely, that an Advisory Council should be constituted to advise and co-ordinate the survey work which was being carried out by Government departments. The Council, it was suggested, should contain anthropological and statistical experts, as well as representatives from the various departments of Government concerned in public health, and that this Council and the central bureau concerned in the arrangement of the data collected by the various survey departments should be attached to Register House, and exercise their functions under the jurisdiction of the Registrar-General.

When the Anthropological Survey Committee was in the midst of its deliberations an Act of Parliament gave us a Ministry of National Service, and on November 1, 1917, the Medical Boards set up by the Ministry commenced a systematic survey of that part of the manhood of the country which had not already been called to arms—all save those who were over the age of 51, or were exempted from examinatian because of the nature of their occupation. The survey which thus came into being, although it differed very materially in its scope and procedure from the survey proposed by the Interdepartmental Committee in 1904, yet is likely to serve our national needs equally well. The Survey proposed in 1904 aimed at registering certain physical measurements—standing height, sitting height, span, weight, colour of hair, skin, and eyes, chest measurements, acuity of vision, head and face measurements, and from such measurements it would have been possible to obtain

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standard data relating to the physical conditiou of definite sections of the people. The Survey being carried out by the Ministry of National Service is of a more practical, more physiological nature. The medical boards have become grading machines, working according to definite standards, sorting the men who come before them—men varying in age from 18 to 51—drawn from known districts into four groups or Grades I, II, III, IV, according to their degree of "physical fitness." In reality, the men are graded according to their capacity as marching and carrying machines—their degree of soundness in "limb and wind." The physical fitness of any section of the population is accurately represented by the number of men placed in the various grades. Besides being graded, certain definite measurements are made of each recruit—stature, weight, chest circumference, colour of hair and eyes, and acuteness of vision. A record, too, is kept of the defect or defects which lead to the assigning of a man to Grades III or IV. We have thus, for the first time, a definite collection of facts from which we may ascertain the condition of our manhood in the various sanitary areas of Great Britain. In particular, we have for the first time a complete analysis of the physical conditions which give us our Grade IV men—men who are physically unfit.

The immediate purpose of the survey which is being made by the Ministry of National Service is to provide recruits for the forces of the Crown. But the survey is also serving a national purpose which is equal in importance to that which brought the Ministry of National Service into being. It is providing us with information of the amount and distribution of "unfitness" throughout the country; it is unfolding for us the parts of our system which are most liable to become damaged under the stress of modern conditions and the extent to which our bodies are affected by signs which indicate physical deterioration. On theoretical as well as on practical grounds we have come to the conclusion that if a population is healthy a random thousand of its young men, between the ages of 20 and 31, should yield 700—seven companies of Grade I men—men fit to sustain the strain of field service; 200—two companies of Grade II men—men fit for the less strenuous forms of military service; seventy-five men of Grade III—men unfit for any form of active physical employment; and twenty-five men of Grade IV—men who are totally unfit from a medical or physical point of view. Grades I and IV may be called "index" grades—the number of

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men in grades being an index of the "physical fitness" of the manhood of an area—while the number in Grade IV is, or should be, an index of the degree of "physical unfitness" prevalent in that particular section of the population. Such is the result which we expect, and sometimes obtain, from a fit population, but there are many industrial towns at the present time which send up samples of a thousand men who, when graded, give results somewhat as follows: Grade I, 190; Grade II, 270; Grade III, 410; Grade IV 130. Let us first look at the numbers in the "index grades" I and IV. In Grade I there are only 190 men in place of 700; in Grade IV there are 130 in place of 25. When we look for the missing men of Grade I we find them mostly in the partially unfit group Grade III. Instead of having 900 men in the "fit" grades —Grades I and II—we have, in this industrial population, only 460; and in place of having only 100 men in the "unfit" Grades III and IV, we have 540. It is clear that certain conditions have been acting on the industrial population from which our sample has been drawn, and have been causing a slump from the "fit" to the "unfit" grades. Now the sample I have cited is quite a common one when the manhood of an industrial town is examined. The objection may be justly raised that such results do not indicate the normal condition of our industrial population, for long before these examinations had been made the cream of the young men had gone and only a residue was submitted to the medical boards for a systematic examination. The fresh recruits which now come up for examination are drawn chiefly from classes over 35 years of age, and one of the principal results of the present survey is to show that men—particularly those engaged in industrial occupations—tend to become degraded at the age of 30, to pass from the upper to the lower grades. The tendency proceeds at a slow and almost uniform rate until 40 is reached; the pace then increases, and at 46 a slump sets in, so that, at the age of 51 scarcely a single representative of Grade I is left in the manhood of an industrial population. The wear and tear of time, amidst the conditions of modern life, exhaust the health and strength of the body to a greater extent than we anticipated. Thus in the sample which I have cited there is an altogether undue proportion of men in Grades III and IV, but that is due to the fact that our sample has been taken from a residual population. Such samples may leave us in some doubt as to the *relative* proportion of unfit

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men in our industrial populations, but they leave us in no doubt as to the total number of the unfit—of the physically unfit—permanently injured in health and in strength, and it is no exaggeration to say that the number is appalling.

Nor is the serious nature of the problem we have to face in any way lessened when we come to examine the gradings obtained from virgin sections of the population—sections which had been previously protected or exempted because of the nature of their employment. I will take a sample from the members of a trade who became subject to compulsory medical examination. The sample is an unfavourable one, but yet not uncommon. A thousand possible recruits yielded: Grade I, 270; Grade II, 152; Grade III, 158; Grade IV, 420. Over four companies of this possible battalion fell out as totally unfit before a gun had been shouldered. The majorities of the casualties were those which attend the warfare of industrial life—"poor physique," limbs defective because of former disease or former injury; lesions of the heart and of the lungs; static troubles, amongst which I count varicose veins and hernia. In some branches of our textile trades it was found difficult to discover a man who was really sound in wind and limb at the age of 40.

How has it come to pass that we, who have led the world in the matters and measures of public health and of sanitation in all its forms, have apparently a larger unfit class than any other of the leading nations. We know other countries have their problem of the unfit, but as far as I can judge ours is more serious than theirs. Before the war Germany admitted that 16 per cent. of her young men were unfit for active military service; our percentage is at least equally great. In seeking to give an explanation of this paradox, I will fall back on a simile. Let us suppose that it is not a plantation of manhood but a garden of plants we have to deal with. The gardener has laid on a supply of excellent water; he has secured a perfect drainage and manured the soil thoroughly; he has cut down the surrounding trees to allow the air and sun free access, he keeps an exact reckoning of the roots set, and of the plants which wither and have to be cast out; every ten years he takes stock of the number of his plants and even of their various kinds. Having done those things, he leaves his plants to struggle as best they may, without individual attention, without pruning and without training. A garden run under such conditions

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becomes a wilderness. Yet it is much in that way we have been treating our garden of manhood. We have looked on the birth-rate and death-rate as better indices of the health of the nation than the fitness-rate or the sickness-rate, or above all of the growth-rate of the children. We have striven to secure freedom for the individual to sell the capital nature has given him—his capital of muscle, bone and brain—where he will and how he will; we have encouraged him to waste it. We have given parents liberty to bring up children where and how they please, in slum surroundings and amidst impoverished conditions. This survey is showing that slums tend to produce men and women of Grades III and IV. Other countries have introduced compulsory physical training for their young men and such a training has reduced the percentages of their unfit grades. I do not believe that under the present conditions of civilized life it is prudent for any State to allow its young men and women to use or abuse the bodily capital with which Nature has endowed them just as they will. I believe that, if all the nations of the world were leagued together to secure peace, compulsory physical training would be necessary to secure health under modern conditions of civilized life.

What then is to be done in connection with our problem of the physically unfit? I think the first object we should keep in view is to obtain an exact knowledge of the extent and nature of the deterioration or unfitness so far as it affects our manhood in each decade. We have to make a survey of our school children—such a survey as is now being made under the Medical Service of the Board of Education. We have to keep an eye on the growth-rate of children in various representative centres throughout the country, just as a physician keeps his finger on the pulse of a patient to discover the progress of his illness or of his health. We have to survey our manhood just as it is being examined now by the medical boards of the Ministry of National Service, and see that it is graded into classes according to a definite standard of physical fitness We have to note the causes and the conditions which lead men to be assigned to a lower grade than is normal to their age, and, having discovered these causes and conditions, to see how far we can prevent or remove them. Besides the general survey which is being carried out now by the Ministry of National Service, it will be necessary, if we would ensure a full knowledge of the national condition of health and fitness, to demarcate certain "test"

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or representative areas for a more complete examination of both children and adults. Such test areas should contain a population of at least half a million—part of which is purely rural, part purely industrial and urban. In such areas accurate records should be made of the state of the teeth and of the mouth, of the nose, throat, ear, eye, lungs, heart and feet. Certain measurements of the body should be taken: standing height, sitting height, span, weight, and diameters of chest. Certain measurements of the head and face and pigmentation of the skin, hair and eyes would also be necessary to determine how far there is a correlation between physical or racial type, physical defect and liability to disease.

Before such measures are undertaken we must agree to accept a definite and uniform British standpoint of physical or anthropometrical measurements. As far as possible those should be uniform with the standards adopted—or to be adopted—in America. We must agree to carry out those standard measurements by similar instruments and by exactly the same methods. At the present time the Anthropological Committee, appointed by the Conjoint Board is drafting a standard series of measurements in correspondence with a similar committee at work in Washington.

Thus it will be seen that I would advocate as a measure of public health, that the Ministry of National Service, although called into existence by the war, and regarded as a war measure, should not, in my opinion, be disbanded when the war is over. Such an organization or machine is absolutely necessary if we would obtain a real knowledge of the wealth of the country—the number of its men who are sound in brain, wind, and limb. The exact position of the National Service machine in, or its relation to, the Ministry of Public Health, is a matter which is difficult to forecast at the present time, but whether included or excluded from that Ministry, I would most strongly advocate the national utility of its conservation as a peace time establishment.

The following remarks were made by Major Leonard Darwin, who presided at the meeting:—

An agitation in favour of an anthropometric survey, or a physical measurement of the people, has been on foot for some time, and for several reasons this is a golden opportunity for pushing forward this reform. We all immensely admire the heroism of our troops at the front, and, as to us stay-at-homes, we have a complacent

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feeling that we have done our duty creditably. Now this optimistic view of the situation seems to have encouraged the belief that the nation can only have inflicted a passing injury on itself by taking part in this war. It is no doubt true that if we had failed more often in our efforts to do our duty, we should have been in a worse plight than we are; but it is equally true that serious racial damage has been inflicted on the nation by the war. The first volunteers, who were drawn from our best stocks, suffered most heavily, whilst all the men who have been put into the fighting line form a highly-selected group of the community. The diminution in the number of the progeny of these picked types will inevitably result in a lowering of the nation in regard to the qualities in which they excelled. If this be a true forecast, when the time comes, the nation should be made to realize this fact without doubt; for such knowledge would stimulate the desire to apply the proper remedies. If the youth of the country were to be measured, say, every ten years, any decline in physical qualities would assuredly be detected, and the nation would be put on its guard. Now is the time to strike, when the memory of our losses is ever present in our minds.

If this survey should be successfully established in the future, the credit for its establishment and maintenance would unquestionably rest with the various Government departments concerned, and the favourable attitude towards the project of those in authority is a matter of great importance. The officials in charge should no doubt be in a position to obtain the advice of leading experts in anthropology, statistics, and biology; and this need seems now to be fully recognized. In the past there has been a good deal of confusion of thought in official quarters in regard to such scientific questions as the inheritance of acquired characters—a fog not yet wholly dissipated in all probability amongst Cabinet Ministers. We are, however, to a certain extent on the horns of a dilemma in regard to the acquirements of those charged with the collection of statistics. If facts are collected with a view to solving a particular problem, and in the hope of solving it in a particular way, the data will often be unreliable; and collectors for this reason should not be theorizers. But if facts are collected without reference to the problems to be solved, they will frequently be collected in the wrong way. If the Government Departments were to be in undisputed charge of the survey, though aided by the advice of leading independent experts in science, this difficulty would thus best be met.

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The problems to be solved no doubt will seldom be wholly elucidated by the mere collection of figures, however well arranged. For instance, this survey might show that the population of our towns was slowly deteriorating; and if this proved to be the case, many would at once jump to the conclusion that this proved that our existing urban conditions were damaging the race: a conclusion which might or might not be true. Signs of decadence in our towns might be due either to the inherently weaker types drifting out of the country districts to the manufacturing centres or to the stronger types quitting these crowded areas to go back to the land. To distinguish between the effects of environment and those of selection, or more generally between cause and effect, is often a matter of extreme difficulty.

The measurement of a people should not be confined to the adults, for one of the best methods of ascertaining the degree of well-being of a population would be to measure the growth of children at schools. Here again the difficulty would be felt of differentiating between defective growth due to bad homes, and that due to inferior inherited qualities. Science will in time, we may hope, enable us to disentangle these effects, thus distinguishing between the immediate effects of social conditions on individuals and the ultimate effects on the race. Periodical surveys of the growth of children would help us to estimate the growth of the race, a growth which may unfortunately be downwards as well as upwards. And all these investigations would make us more clearly realize the importance of attending to both of the two wholly distinct factors of heredity and environment.

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Members: Capt. Percy Nunneley; Jeremiah W. Roberts; Philip O. White.

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THE CARE OF PENSIONERS AND DISABLED COMBATANTS IN RELATION TO NATIONAL HEALTH AND WEALTH.

BY

SIR JOHN COLLIE, M.D., C.M.G.

A Lecture delivered at The Royal Institute of Public Health.

I THINK it advisable at the outset to state in what sense I interpret the principal terms of my subject: Health and Wealth when qualified by the adjective "National." "Health," in the national sense, connotes not merely physical but *moral* well-being. A nation composed largely of the physically unfit would be devoid of the energy and the vital stimulus which are absolutely essential for the maintenance of a true national life. "Wealth," as applied to a nation, is represented by the extent to which, supplementing its natural resources by its labour, it increases its standard of living beyond what is necessary for bare existence. All the *amenities* of life are covered by the term. It is possible for a healthy nation which is not wealthy to remain so, but a wealthy nation which is not healthy must degenerate.

As an integral part of the wealth of a nation is its health, it is difficult to keep the two branches of my subject entirely distinct, but I propose as far as possible to deal with them separately. First, as being the topic with which this Society is more intimately concerned, let me deal with the National Health as it has been affected by this terrible conflict. The effect upon the general health of the community, of more than four years of war, has been very great. The continuous effort which we have all been called upon to make, coupled with the restrictions upon the amount and quality of our ordinary food, has undoubtedly deteriorated the national stamina. It is true that in many instances useful occupation and diminished supplies of unnecessary food have been of great advantage, yet on the whole it is to a community with a lowered standard of health that the thousands of maimed and invalid men are returning. A grievously large proportion of our young and vigorous manhood is lost to us for ever. The effect of this upon the future of our race is a matter of deep concern, and emphasizes

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the need that no means should be neglected by which the standard of health may be raised to its highest limits. The remedial methods which should be adopted so far as the general population is concerned are matters with which your Society is concerning itself; the subject of my particular care is the disabled combatant.

It is well to form some idea of the magnitude of the task with which one is faced—it is not possible to be exact, for the end is not yet—but, up to the present time, of the men who have returned to civil life from the Army some 70,000 have received medical and surgical treatment through the Ministry of Pensions. How far this number will be increased before hostilities cease no one can say, but we do know that there are many thousands at present under treatment in military hospitals who must shortly be our care. In addition there are at present in Germany over 140,000 prisoners belonging to the rank and file of the British Armies, and of these it is safe to assume at least 100,000 belong to these islands. The condition of health in which they will be returned to us we hardly dare contemplate. I fear from all accounts of the hardships to which they have been subjected, there will be but a small percentage which will not be in need of our solicitude and care. Is it possible to make a more infamous charge against a civilized nation? If wounds and injuries alone were the disabilities from which these men suffer my task would be comparatively easy. But the conditions under which this warfare is being waged are such that one wonders how mortal men have survived them. I shall not harrow you by describing these conditions, but I have seen and have to deal with the results. Not only have the physical qualities of our men been tested to the utmost, but mentally they have been subjected to such stress that in countless instances the higher nerve centres have been affected. All this would have been different if our armies could have been composed of absolutely fit men, but the exigencies of our needs involved, in too many cases, the use of material ill-adapted for the purpose. Nerves, even of the strongest, have been shattered, and latent disease, which might well have lain dormant, has been awakened and fostered by the strain and exposure of active service. Much sickness and misery has been distributed throughout the country, producing a deleterious influence on the country as a whole, yet on the other side we have to take into account the undoubted benefit which the national health has derived from the improved physique and healthy

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conditions of those who have gone through a course of military training who, but for this, would have been puny and of low grade. The hardships of campaigning, and the debilitated condition of men whose general health has been impaired by wounds or sickness, render them most susceptible to those diseases which are more apt to invade the system when it is in a lowered state of vitality. The great increase in the number of cases of tuberculosis with which we are confronted is due to this. It is clearly the duty of the nation to provide an adequate medical service for those who have lost their health in the service of the country, and our debt to those who have risked life and health in our defence will only be redeemed when we have done our utmost for them.

Prior to the war the necessity for better provision for ensuring the health of the nation was beginning to be recognized, but the the facilities for institutional treatment were sadly deficient. The requirements of the serving soldier were naturally the primary consideration, and all the available facilities were placed at his disposal. In time the facilities were increased to an almost incredible extent, but even so, while all that was humanly possible has been done, it has been very difficult to keep pace with the requirements. A short résumé of the work of the Medical Service Branch of the Ministry of Pensions will be of interest. In January last there were 4,300 pensioners under treatment, to-day there are more than 30,000; and over 45,000 have been discharged from treatment up to date. Arrangements have been made with most of the general hospitals in the United Kingdom, and over 400 are providing treatment for discharged men. In some instances hospitals, exclusively for the use of disabled men, have been established, and, where accommodation has been urgently required, hospitals have been assisted in making extensions, the Ministry providing part of the funds necessary for the purpose. Arrangements have also been made with various hospitals which specialize in certain diseases: It was, however, found that these arrangements would not be adequate in certain areas; while, for certain complaints, such as neurasthenia and shell shock, there was naturally no special provision. Accordingly it became necessary to establish special institutions, and in this work the Ministry has been assisted by funds generously supplied by the British Red Cross Society and the Society of St. John, and by private individuals. Seven Homes of Recovery for Neurasthenics have already been opened,

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and others are in course of preparation. In all, forty-three institutions of various kinds have been established solely for pensioner cases, and these contain approximately 2,100 beds. In times of peace orthopædics do not loom so large on the field of surgery, but orthopædic surgery has always been stimulated by war conditions, and this is especially true as the result of this war. The surgeons of the Army were not slow in rising to the emergency suddenly presented, and—taking advantage of their opportunities—have raised orthopædic surgery to its present important position. It became obvious that their skill must be available for the discharged men, and accordingly arrangements have been made with the War Office that annexes to the special military surgical hospitals (at which only orthopædic treatment is given) shall be established, in convenient centres, for the treatment of discharged men. There, although the ordinary staff will be provided by the Ministry, the special orthopædic surgeons of the military hospital will supervise the treatment and advise upon and undertake the operations. A scheme has been prepared for the establishment of fifteen such annexes, and it is hoped that in spite of the great difficulties of builders it will be possible to carry it out. The paraplegic has rightly been the subject of much consideration, and for these hopeless cases it is felt that the utmost must be done; not, unfortunately, with much hope that they may be completely restored to health, but that their remaining days may be spent under the most advantageous conditions. It is hoped to establish special homes in connection with hospitals which will be responsible for the treatment, and it is the intention that there shall shortly be one such home at least in every county, or group of counties, so that these men may be easily accessible to their friends. The Ministry is not responsible for the treatment of discharged men suffering from tuberculosis, that duty is laid upon the National Health Insurance Commission. The Ministry has received authority to expend a sum not exceeding £20,000 per annum on the after-care of discharged men suffering from tuberculosis. Grants will be made for the provision of extra nourishment and to enable the men to move to healthier surroundings or to take up more suitable occupations. The number of Health visitors is to be increased. I should not be worthy of my position if I were satisfied with all that has been done. Every effort has been made to meet the situation, but the provision of treatment for this army of men at a time

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when every hospital is full and overflowing, and thousands of private buildings have been commandeered by the Army, has necessarily been undertaken in circumstances of great difficulty. It is not for me to catalogue these, but I may be permitted to say that a full knowledge of the conditions in which the work has had to be carried out would considerably disarm criticism. Now what of the future? The time is soon approaching, we hope, when an adequate supply of medical and nursing skill will be at our command and sufficient institutional accommodation available; when the services of our best medical men are no longer required for the battlefield, when our hospitals cease to be the repositories of men fresh from the scene of strife, we shall better be able to cope with our needs. Our aim is to leave no man with a single degree of incapacity which surgical and medical skill can remove. In conjunction with the remedial services which we offer, the fullest opportunities for training will be given. Major Mitchell, the Director of Training, has already initiated many schemes, and his useful work has done much to supplement the labours of the Medical Service Branch. The Training Branch of the Ministry of Pensions is an important corollary to that of my own. It would be a deplorable waste of effort if those whose disabilities are such that they can no longer pursue their usual work were not trained in arts that are within their capacity, and if those whose injuries, whilst permitting them to continue in their own line of business, have produced a lessened capacity, were not instructed in the best methods of making use of their remaining powers. The present condition of the labour market is such that it has militated against men taking full advantage of the facilities which are even now offered them. A man with a certain limitation of movement caused by his injuries, a limitation which a course of treatment would either remove or reduce, is capable of performing services which are at the present time eagerly sought after and well remunerated. It is small wonder that, pressed as he probably is by the needs of his family, and finding a ready market for such labour as he is capable of, he seizes the opportunity in preference to undergoing what will probably be a tedious and painful process of treatment. But when the demand for labour, however inefficient, ceases, as it is bound to do with the return of the able-bodied and strong, renewed efforts must be made to induce these men to improve their capacity to the fullest extent.

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Up to the present our efforts have been directed to finding treatment for those who need it; in the future we hope to deal with all those who ought to have it. There are many men who would benefit by treatment who have not applied for it, and in the exigencies of a war-time service we are perforce content to let this be so. The standard I aim at is one in which we shall not rest until *every* disability is reduced to its minimum; movements which are restricted shall be made as free as possible, and all impaired conditions of health due to service shall be improved so far as medical science will permit.

The man who is content to drift along accepting his incapacity, and incidentally exciting sympathy, must be sought out and persuaded to be at least self-supporting. Orthopædic centres, our out-patient clinics, our psycho-therapeutic clinics, and our homes of recovery have produced very satisfactory results in restoring capacity to men who might well have been thought to be hopelessly incapacitated. There are few maimed men in whom a course of orthopædic treatment would not effect a marked improvement. More particularly is this the case with men whose incapacity is of a degree which permits them to do *some* work. These are the men whom modern methods would restore to a near approach to normal capacity, and in whose case the best economic results would follow. There are many men who will fain be content to remain in their present condition and risk subsequent deterioration. With their pension and present (diminished) earning capacity, they are loth to submit to further tiresome, and perhaps painful treatment: they think they are fairly well off as they are. But in the interests of the State this cannot be allowed. All these cases must be induced to undergo the treatment. If a man fails to recognize his duty to his fellows, then I think it is desirable that the refusal should be penalized. If a man will not recognize his responsibilities to the State, he can hardly press his claim that the State should recognize its responsibilities to him, for the whole foundation of the relation between the State and individuals is based on reciprocity.

Adequate treatment will be costly. Those who are unconvinced of the necessity for incurring these obligations on the score of public health alone, I invite to consider the proposition from the point of view of national wealth. What is the position in which we now stand? An enormous burden of debt has been incurred which only the utmost industry and continuous effort will enable

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us to liquidate. Many who would have shared this financial burden have met their obligations in a far more glorious way, so that greater demands must be made on those who remain; and we cannot afford to allow any one to be unproductive. Although, perhaps, from a sentimental point of view, we might desire to contemplate our disabled men living a life of ease, there is no doubt that the nation must call for further efforts from them if she is to repair, within a reasonable time, the ravages of war, and resume the task of making the national life more eligible. Work of the first importance for the maintenance of property and essential services has perforce been subordinated to more exigent demands, and must be taken in hand at the earliest possible moment, or irreparable loss will ensue. Vast tracts of fertile land have been laid waste and prosperous towns razed to the ground, and though we can rejoice that in this respect we have suffered little, our obligation to take our share in the work of restoration is undoubted. Much of the productivity of the land has been reduced because labour has been scarce, and much will be required before the position is regained. The constructive work that has accumulated while destruction has been rampant will make a constant demand upon our efforts for many years to come.

Our natural resources remain much as they were. Very little real destruction of natural wealth has resulted from the war, but its development has been retarded. The substantial loss that has to be made good arises from the fact that energies which should have been applied to the progressive requirements of civilization have been diverted from their natural course. There are some who contend that all that has been expended in the war is not waste—that apart from the material which has been blown away in the shape of explosives, or been sent to the bottom of the sea, nothing has been lost, though it may be strangely transformed. This, to my mind, is quite fallacious, but, at all events, it cannot be denied that the really irreparable loss is the loss of labour, which forms so vital an element in the computation of a nation's wealth. Natural resources have no value if the labour necessary to transform them into useful commodities is lacking. Oysters in their natural state are of little value as an article of food. You must have the means to open them. I quite admit that in this respect there are compensating factors. The labour that remains has acquired a greater value. If there were an adequate supply of able-bodied labourers, it might be a matter for debate whether, from the economic point of view alone, it was desirable to expend much energy and money

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to secure something which was less than the best. But the conditions now—and they will remain the same sufficiently long—are such that it is well worth while to bring every man to the top of his capacity, however small it may be, so that he may render service to our needs. Perhaps a commercial illustration will make my meaning plainer. Since tin has been in the neighbourhood of £300 a ton, it has been worth while to work mines which were valueless when that commodity was fetching £100 a ton or less; so in the case of a man, if labour were plentiful, and, consequently, badly paid, it might be doubtful whether it was a paying proposition to bring into the market anything that was not of the highest standard. We are told that, judging from the experience of past wars, immediately following the cessation of hostilities, there will be a period of great trade depression. One can well appreciate that during the transition from warlike to peaceful occupations there will be great dislocation of trade. Time will be required for the preparatory measures in connection with the great work of reconstruction to proceed. Vast numbers of men, and women too, who have been employed on what may be comprehensively termed "munitions" will be returning to their normal avocations, and the men from the armies will have to be absorbed into civil employments. With our stocks of material sadly depleted it will necessarily be some time before they can be replenished and works for their absorption devised and instituted; therefore one can well see that a difficult position is bound to arise for a time. I contend that it is then that we should make our maximum effort to provide treatment for the disabled men. We should seek them out and offer every inducement for them to undergo whatever treatment is needed to add to their capacity. Such a policy will have at least two advantages: it will withdraw men from competition at a time when it will be advantageous to reduce competition to a minimum, and it will enable them to prepare for the time when their service will be of the greatest value. The initial difficulties in the economic situation will be overcome and everything put in train by the time the treatment is completed, and when the man is again prepared to face the world the world will be ready to welcome anyone who is able to assist in the work which will then be at hand.

It must surely be admitted that most of the considerations which were recognized as valid in justifying the provision of facilities for remedial treatment for the young, so that the standard of national health might be improved, apply with equal, if not additional force

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in the case of the disabled man. If it was good policy to establish a service for removing physical conditions which would militate against the full development of capacity, it is surely equally wise to restore capacity which has been developed but has been reduced and is threatened with extinction.

We must not lose sight of a factor the importance of which cannot be denied, and that is the marvellous effect upon a man of the knowledge that he can do something. If a man is rendered capable of doing a very little he is immediately uplifted from the terrible state of despondency which is associated with a feeling of absolute helplessness. All those who have been in contact with men when they have thought that nothing remained for them but a hopeless, helpless existence can testify to the wonderful change that takes place when it is borne in on them that their worst fears are groundless. Normal-minded men are creative beings, and the notion that this power is lost leads to despondency. The consequent mental and physical deterioration is great. I am now about to raise a point which it will be the duty of others to deal with. It will, in my opinion, be a disaster if, when we have brought a man to the highest possible pitch of efficiency, any obstacle is offered to his entrance into the labour market, or he is met with a restriction on his output. How far it will be the policy of the Trade Unions to keep up prices by limiting output I do not know. All the indications point to there being a sufficient demand for labour to make any kind of labour a most valuable commodity for years to come, and I trust that every disabled man will be encouraged to use his powers to the utmost. The argument may be quite admissible that if prices are maintained disabled men will receive a proportionately high rate for the services they are permitted to render. Be it so; but if I were prepared to concede the desirability of a restrictive policy in the case of the ordinary worker, of which I am not, I am convinced that in the case of the partially disabled man it would be the greatest mistake to prevent the fullest use of his powers. I cannot urge too strongly on those concerned that from the medical standpoint it is most essential that no artificial impediments shall be put in the way of men whose salvation will, in many instances, lie in continuous occupation. That is a view which I am confident will receive universal support on the medical side, and I trust the politicians of the Trade Unions will recognize that it is their duty to give full weight to this consideration; they must not be led away by merely one side of the financial

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aspect, but must have regard to the physical and mental well-being of these men, who are still Trade Unionists probably, although they are disabled men. It will be no answer to say that full monetary compensation shall be exacted from the State for their lost capacity. Although we would all desire to meet our obligation in this direction, we should also recognize that money is not everything, and that we must allow these men to retain their self-respect, which can only be done by letting them feel that they are useful citizens and not a clog upon the State.

I should like to place a few figures before those who, because they view with apprehension the expenditure involved, are hesitating to support my policy that the best remedial services shall be available to the utmost extent for the treatment of the disabled. Suppose that as the result of treatment 100,000 men have their earning capacity increased to the extent of 10s. a week, taking the average working life at only twenty years, that would represent £52,000,000 which has to be placed to the credit of the account. But far greater results than this will be attained. I think there can be no doubt that the difference in cost between the treatment that the dictates of common humanity demand and that which will leave us with the knowledge that we have done all in our power will be more than justified by the resulting increment to the earning capacity of the nation. If a comparatively expensive process of treatment results in only a slightly increased capacity it is a good investment, for the improvement in the capacity proves a source of revenue to the man for most of his life. It is axiomatic that the man who consumes more than he produces is a burden on the State; and the man who produces least is the greatest burden. Although it may not be possible to bring a man to the stage at which he is self-supporting, any extent to which he is enabled to meet his own requirements is an undoubted asset. We are all, so to speak, in a boat in which we have at least to pull our own weight. The efforts of some may be sufficient to carry along others who are not capable of doing their share; but we cannot carry too many passengers. Our moral obligation to those who have bled and suffered in our stead is a cogent reason for the provision of the best that can be rendered for the amelioration of their condition. The benefits that will thereby accrue to the national health constitute a second reason. These should be sufficient; but, being a Scotsman, I prefer to have a third: it is economically sound.

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THE BACTERIOLOGICAL TESTING OF DISINFECTANTS.

A Communication from the Research Laboratories of
The Royal Institute of Public Health.

DURING the war difficulties have attended the testing of disinfectants to comply with the War Office specification. An investigation into the possible causes of these difficulties has been made, an account of which forms the subject of this communication.

A specimen of a War Office specification is as follows: The liquor cresoli saponatus fortis is to be a disinfectant which shall consist of a saponaceous solution of tar acids which, when dissolved in or emulsified with water, shall have a coefficient of not less than 10 nor more than 12 when tested by the Rideal-Walker method.

The test mentioned in the specification is the Rideal-Walker test, which consists in comparing the action of the disinfectant on a pure culture of the *Bacillus typhosus* with the action of phenol solution on the same culture. It is very rarely, if ever, that a disinfectant is called upon to act in the artificial conditions which govern the test, for it is well known that the action of disinfectants is affected by organic and inorganic substances, especially albuminoid substances, many of which are present in morbid products. The introduction of any of these products into the test, such as has been attempted by Martin and Chick and others, has an effect upon emulsifications of coal tar disinfectants which is disproportionate to the effect upon solutions of carbolic acid, and hence carbolic acid ceases to be a control.

The possible sources of error in the use of the test have been investigated in detail.

(*a*) *Lemco.*—The analysis of this did not indicate any definite change in composition, and the bacteriological variations obtained under conditions of war Lemco as against pre-war Lemco fell considerably short of explaining the great differences which were arising.

(*b*) *Peptone.*—Experiments were made on the same sample of disinfectant, using media prepared from different peptones,

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and the findings are recorded in Table I. These led to the deduction that the actual peptone content in the peptones which were being supplied as substitutes for Witte's peptone—which was at this time unavailable—was less than in Witte's. The *Lancet* (1916, p. 9) says: "Even before the war the preparation of a standard broth for bacteriological purposes was a matter of considerable difficulty, since different samples of Witte's and other peptones exhibited such marked variations

TABLE I.—Coefficiency of Coal Tar Disinfectants against Different Peptones.

Sample (A) W.O.H. 24.		*Sample (B)* 0357.	
Peptone used	Coefficient	Peptone used	Coefficient
Witte's	15	Allen and Hanbury	> 24·0
Fairchild Bros. and Foster ..	13·75	75 per cent. Allen and Hanbury; 25 per cent. Baird and Tatlock	> 21·81
Baird and Tatlock (bactopeptone as supplied to India Stores Depot, London)	12·72	72½ per cent. Allen and Hanbury; 27½ per cent. Baird and Tatlock	21·36
Baird and Tatlock (bactopeptone as supplied to India Office Stations overseas)	9·09	70 per cent. Allen and Hanbury; 30 per cent. Baird and Tatlock	20·9
Baird and Tatlock (ordinary peptone)	10·0	50 per cent. Allen and Hanbury; 50 per cent. Baird and Tatlock	16·36
Baird and Tatlock (ordinary peptone, another sample)	7·72	Witte's	21·81
—	—	Fairchild Bros. and Foster ..	20·0
—	—	May and Baker	19·0
—	—	Baird and Tatlock (bactopeptone ex India Stores Depot)	18·0
—	—	Baird and Tatlock (ordinary bactopeptone)	13·63

> Signifies greater than.

when employed in nutrient media that the cultural features of an organism were apt to vary with each sample used. Since the cessation of the supply from Germany this trouble has been accentuated, and in work that we have been doing for the Medical Research Committee on the differentiation of the members of the colon-typhoid group we have felt it acutely, because the results obtained when a given sample of peptone is used cannot be repeated with certainty with another sample. This is, in truth, readily explained. 'Peptone' is no more than a name which may stand for widely varying substances. Usually it consists of

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a mixture of proteoses, peptones, and polypeptides which differ enormously both in complexity and amount, according to the materials employed, the length of digestion allowed, and the exact method of preparation followed."

TABLE II.—SHOWING INCREASE OF COEFFICIENTS AS CONTENT OF PEPTONE IN BROTH IS INCREASED.

Sample No.	Make of peptone	Grm. 20 co-eff.	Grm. 30 co-eff.	Grm. 40 co-eff.	Grm. 60 co-eff.	Grm. 80 co-eff.
294	May and Baker	7·27	—	9·09	10	10
294	Baird and Tatlock (Bactopeptone)	<7·27	—	8·18	9·09	10
294	Foster Bros. and Fairchild ..	7·72	—	>9·09	>10	—
294	Allen and Hanbury (Armour)..	7·27	12·5	—	—	—

> signifies greater than. < signifies less than.

TABLE III.—COMPARATIVE PRACTICAL PEPTONE DIFFERENCES OBSERVABLE DURING MAKING UP BROTH.

PEPTONE	COMPARED WITH WITTE'S PEPTONE			
Maker or supplier	Name of quality	Estimated comparative speed of broth filtration (assuming Witte's as x hours)	Adhesiveness to vessels (Witte's not sticky)	As bacterial medium (considered on basis of development of *B. typhosus* only) (Witte's taken as normal medium)
Fairchild Bros. and Foster	Ordinary	$12\,x$	Very sticky	Retards growth
Fairchild Bros. and Foster	Bacteriological	x	Sticky	Equal to Witte's
Allen and Hanbury	—	$x/_2$	Not sticky	Retards growth
Baird and Tatlock	—	x	Extremely sticky	Equal to Witte's
Baird and Tatlock	Bactopeptone	$x/_2$	Sticky	Growths always very strong
Baird and Tatlock	Bactopeptone (as supplied to India Store Depot, London)	$x/_2$	Not sticky	Equal to Witte's
Baird and Tatlock	Bactopeptone (as supplied to India Store Depot abroad)	x	Sticky	Equal to Witte's
May and Baker	—	$2x$	Sticky	Equal to Witte's for a short time, when growths begin to become very strong

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Experiments were also made with the same disinfectant and a constant sample of peptone, but varying the quantities of the latter used in the manufacture of the broth. The results are recorded in Table II. It is known that the principal suppliers of peptone admit that the qualities of their makes cannot at the present time be guaranteed. The American peptones are chiefly made from beef, and the cattle slaughtered are a mixture of young and old beasts, fed indiscriminately, and certainly not bred with a view to the preparation of pure peptone. Peptones extracted from old and young cattle indiscriminately are not free from sugar, and although a sugar-free peptone (manufactured in America) can be purchased at the present time, the American makers do not manufacture it with the slightest consideration for Rideal-Walker test requirements. Further, the bulk of the peptones coming from America are not manufactured out of consideration even for general bacteriological work, by far the greater bulk being consumed in the manufacture of peptonized foods, &c. These differences in the peptones have been demonstrated in the practical making up of the broths for the Rideal-Walker test (compare Table III). Witte's make of peptone was always found to filter easily, and on each occasion at about the same speed ; and its adherence to glass funnels, watch glasses, rods, &c., was very slight. Other makes, as illustrated in Table III, filtered in quite a different manner and were far more sticky and adherent to the vessels in question.

Reference should be made to the original description of the Rideal-Walker test contained in the *Journal of the Royal Sanitary Institute* (vol. xxiv, 1903). Many suggestions have been made and many modifications have been adopted in various laboratories, but as the War Office Contract Specification distinctly refers to the Rideal-Walker method it may be assumed that the original description is the one intended. This does not give any stipulation as to whether a particular make of peptone, a particular brand of meat extract, or fresh beef extract shall be used in the preparation of the broth, and thus, as Table I illustrates, the same sample of disinfectant can give a coefficient of both 7·7 and 15 (and another sample of disinfectant one of both 13·6 and greater than 24) and yet satisfy the Rideal-Walker method and be within the terms of the contract specification.

The test, however, was set out in an expanded and more detailed form by Partridge in " Bacteriological Examination of Disinfectants,

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1907," and in this, when describing the preparation of the broth, the author specifies the following : Lemco, peptone (Witte's), salt (sodium chloride). This is more satisfactory, as on Witte's peptone much more reliable results can be obtained, but the unfortunate position has arisen that the War Office Contracts Department has commandeered the entire supplies of Witte's peptone and deprived all other workers of this ingredient, thus throwing them back upon other makes, which do not enable them to get results agreeing with those obtained by the War Office on the Witte's peptone basis.

(*c*) *Carbolic Control.*—The practical germicidal value of a disinfectant was never expected to be obtained from the Rideal-Walker test, the aim admittedly being confined to a numerical comparison of disinfectants with a "standard." In the original description, tables are given illustrating this point, and the statement is made that "it will be noted that this (variation) is a factor which ceases to be of interest in the presence of a standard control." But subsequent work has vitiated this contention, as the following quotations demonstrate :—

"The presence of 10 per cent. of blood serum in the testing material reduces the efficiency of a 1 per cent. phenol by about one-eighth. The effect upon emulsified disinfectants is greater."

Also : "The presence of particulate organic matter (e.g., albumen prepared in a state of fine division, bacteria, &c.) was found to affect the germicidal value of emulsified tar acid disinfectants to a much greater extent than that of phenol solution. The whole of the emulsified tar acids could be removed by a suitable addition of the particulate organic matters named."

Again : "The reduction in the case of the emulsified tar acids was found to be higher the finer the emulsion." (Martin and Chick, *Brit. Med. Journ.*, January 30, 1909.)

"Taking the *B. coli* as the test organism in its natural habitat in fæces or urine, certain potent emulsified disinfectants had their activity reduced to two-thirds and half of their value as tested on the same organism in an aqueous suspension. The activity of phenol however was much less affected, in fact only slightly reduced under these conditions."

"Results obtained (on *Micrococcus pyogenes aureus* and the *Streptococcus pyogenes*) show that potent emulsified disinfectants which, when tested on the same organism without organic matter, may be twelve or more times as active as phenol, when acting on

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these organisms in pus, may be only two or three times as active as phenol." (Kenwood and Hewlett, *Lancet*, March 20, 1909.)

"All antiseptics combine with proteins in solution or with cells, and hence bacteria lying in pus or blood are shielded from their action. This is recognized as the "quenching" action of these fluids, and it is well recognized that the effect is much greater with different antiseptics; mercury salts, for example, are quenched to an enormous extent, carbolic acid relatively but little. But this is not the whole story. The mixtures of some antiseptics and blood will become an unfavourable culture medium for bacteria or the compound of the antiseptic and the protein will dissociate, giving a slow but continuous antiseptic action, such as is desired by some surgeons and referred to as a 'depot-action.' With other antiseptics this is not the case and the antiseptic is either completely destroyed, or at least rendered inert, by combination with protein. Hence if we test the former on infected blood, making a mixture that is not completely sterilized in a certain period of time—say fifteen minutes—and then re-test from time to time, we shall find the number of bacteria will steadily fall off. With the second group, on the other hand, there will be a transitory fall in the number of bacteria, after which they will grow, perhaps not so well as before, but under some conditions much better. Carbolic acid is an example of the first class, eusol of the second. For example, a mixture of carbolic acid and infected blood which is just not sterilized in a quarter of an hour will be completely so in one hour; whereas a mixture of eusol (undiluted) and infected blood in equal parts will show some diminution in the number of bacteria if tested after a quarter of an hour; whereas if it is re-tested after one hour abundant growth will have taken place and it will be undistinguishable from the control." (Emery, *Lancet*, April 15, 1916.)

With the lack of availability of Witte's peptone it seems that the value of the carbolic control ceases to exist. To overcome this in part, cultures may be grown on a Witte's peptone broth, so that the characters of the culture may remain normal, this method at any rate eliminating war conditions. The broth in the inoculation tubes (into which bacteria are transferred by a loop after the action of the disinfectant) is a factor which may have a less important effect on the result after the disinfectant has done its work. Hence for these tubes broth made on any peptone may be used, and in

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this way a great saving is made in the use of Witte's peptone. But there is an objection to this method in that, in the case of bacteria rendered feeble, but not killed, by their contact with the disinfectant, the resuscitating power of a broth made with one peptone may be unequal to that of a broth made with another peptone.

Further, to-day in nine laboratories out of ten, Witte's peptone does not exist, and hence in most cases even the cultures cannot be made with Witte's peptone broth.

(*d*) *Broth Culture.*—The number of times the organism is subcultured before use appears considerably to affect results. Figures recorded in Table IV. illustrate this point.

TABLE IV.—EFFECT OF AGE OF CULTURE ON COEFFICIENT.

Sample No.	Peptone used	Age of culture	Coefficient
0357 ..	75 per cent. Allen and Hanbury 25 per cent. Baird and Tatlock	.. 2 ..	>21·81
0357 ..	75 per cent. Allen and Hanbury 25 per cent. Baird and Tatlock	.. 22 ..	18·18
0357 ..	72½ per cent. Allen and Hanbury 27½ per cent. Baird and Tatlock	.. 2 ..	21·36
0357 ..	72½ per cent. Allen and Hanbury 27½ per cent. Baird and Tatlock	.. 9 ..	20·9
0339 ..	May and Baker	.. 14 ..	16·36
0339 ..	May and Baker	.. 56 ..	12·5

By age in this case (column 3) is meant the number of twenty-four hours' broth cultures made from the original agar culture.

> signifies greater than.

The original Rideal-Walker description does not state the number of broth subcultures to be taken from the agar stock culture, and a good deal of difference exists in laboratories as to what is considered to be the correct number of twenty-four hours' subcultures to be made to get a standard growth. In some laboratories the first twenty-four hours' subculture is used, in others the third twenty-four hours' subculture, whilst in others not less than the seventh twenty-four hours' subculture. However, what differences do exist, resulting from the subculturing in broth, are legitimate within the meaning of the Rideal-Walker method, and this alone allows far too wide a limit to expect anything like agreement in results. Even Rideal and Walker seem later to have recognized this point, *vide* their letter to the *British Medical Journal*, April 6, 1907: "The resistance of the test organism even when subcultured from the same stock varies from day to day."

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(*e*) *Drops.*—Experiments showed that the size of the drops does not make any very great difference in the results, but this is by no means always the case. For instance, samples were done when a difference of coefficiency as between 8 and 13 was found, partly through variation in the size of the drops in the test (see Table V). Here again, reference should be made to the original

TABLE V.—VARIATION IN THE SIZE OF DROPS OF CULTURE.

A.

Disinfectant No.	Size of drop	Culture medium	Coefficient
W.O. (H.) 24	0·05 c.c.	Witte's peptone, five subcultures ..	11·5
,, ,,	0·10 ,,	,, ,, ,, ..	11·5

B.

Disinfectant No.	Drops to 3 c.c. of disinfectant		Culture medium	Coefficient
	No.	Total volume		
686	3	0·12 c.c.	Fairchild's bacteriological peptone, four subcultures	< 11·8
686	3	0·3 ,,	Fairchild's bacteriological peptone, four subcultures	> 10

< signifies less than ; > signifies greater than.

C.

Disinfectant No.	Culture medium	Coefficient	
		Original R.W. technique	W.O. technique*
0379	Witte's peptone	13·5	8·3
0380	,, ,,	14·0	7·9

* War Office technique included :—

(*a*) Size of drop equals 0·1 c.c. to 1 c.c. disinfectant; instead of ordinary pipette drop, 0·04 c.c. to 1 c.c. disinfectant (original R.W. method as ordinarily understood).

(*b*) Weighing of disinfectant for diluting purposes; instead of measuring (original method as ordinarily understood).

Rideal-Walker description. The only datum given is that one drop of the culture must be inseminated into the medication tubes for each cubic centimetre of disinfectant dilution contained therein. The ordinary pipette, however, drops 1 c.c. per 25 drops approximately, i.e., each drop constitutes approximately 0·04 c.c. If standard or special pipettes, burettes, &c., are used, the drop can be made any size (within limits) by arrangement, but as nothing is

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specified beyond what is stated above, any variations due to this factor are permissible within the test. Partridge, in his expansion of the Rideal-Walker test, explains in regard to this particular point that each drop should measure 0·1 c.c., but this is not confirmed by Hewlett ("Manual of Bacteriology," 1918), who states that 4 drops of culture in the test are equivalent to 0·2 c.c.

That a difference in results may be found between different laboratories if the size of the drop is varied, may be easily understood if it be remembered that the addition of organic matter affects emulsions of disinfectants to a greater extent than solutions of phenol.

Also Hewlett may be quoted as follows (*Lancet*, March 20, 1909) :—

"The number of bacteria to be destroyed is not a negligible factor, and has often been overlooked. To destroy the bacteria in a cubic centimetre of water to which a drop of broth culture has been added is a different matter from destroying the bacteria in a thick suspension, e.g., Chick and Martin found that phenol in a concentration of 8 parts per 1,000 acting on *B. paratyphosus* at 21° C. gave the following results: 187,000 organisms per unit volume were killed in 2·25 minutes; 440,000 organisms per unit volume were killed in 4·5 minutes; 56,000,000 organisms per unit volume were killed in 32·75 minutes; 66,000,000 organisms per unit volume were killed in 34·5 minutes."

(*f*) *Temperature.*—The importance of a constant temperature is well recognized, and results are liable to vary considerably in hot summer weather unless care is taken to keep the dilutions to be tested within the usual range of 15—18° C.

(*g*) *Strain of Typhoid.*—In our laboratory we have not found that the source of the typhoid culture makes any material difference to the coefficient. In some laboratories quite the reverse of this result has been found and tables are given in support of this point in the original Rideal-Walker description.

Conclusions.

From these experiments it is clear that the varying character of the peptone used in preparing the medium for the growth of the test organism has been the chief cause of the difficulties in obtaining concordant results as compared with pre-war times.

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The Rideal-Walker test itself is difficult in execution on account of the attempt to include in one test all the variable factors. The times required for disinfection by the sample and the control have to be identical, but they may vary on different occasions from two and a half to fifteen minutes, so that the coefficient gives no indication of what the actual time of disinfection was, save that it was within the limits of the test. We suggest that the test would be much simplified if a definite time of contact, the same for all the dilutions, was used in the test instead of the intervals of two and a half minutes. In this way the coefficient would indicate that disinfection had been obtained after a known interval of action. This would much simplify the test and would enhance the likelihood of the same results being obtained in different laboratories. Hence the test, thus modified, would be more suitable for commercial use and for inclusion in a contract specification.

As an instance of the difficulties of manipulation recognized as being present in the bacteriological testing of disinfectants, it may be recorded that the United States Government Hygiene Laboratory has devised a machine which is claimed to have several advantages over hand manipulation. It consists of a table upon which rests a water-bath kept at 20° C., a travelling carriage, and a flaming device. Two test-tube racks are placed in the water-bath. The first rack contains the various dilutions of the disinfectant, and the second rack the test cultures. The contents of the tubes in the first rack are poured into the tubes of the second rack by tilting the first rack at an angle of 90°. The travelling carriage holds the platinum loops, and it may be moved forward and backward and brought to an accurate stationary position with the wires in a direct perpendicular line with the mouths of all the test-tubes. The flaming device consists of a gas tube at the back of the machine, slotted so that the wires can be lowered into the flame at the end of each inoculation. In comparative tests done by hand and by machine, several differences were found in the shorter time intervals, but in the longer time intervals the same results were obtained.

It is evident that any method of testing which requires such mechanical aids to manipulation is not likely to lead to concordant results being obtained when done in the ordinary way in different laboratories.

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Reviews.

A Manual of Chemistry. By Arthur P. Luff, M.D., B.Sc., and Hugh C. H. Candy, B.A., B.Sc. Sixth Edition. London, 1918: Cassell and Co. Pp. 745. Price 12s.

The popularity of this Manual is still maintained, and we now have the sixth edition, which has been enlarged. It has been written and adapted to the requirements of medical students. In some curricula the second year of medical study now includes much more organic chemistry than formerly, hence considerable additions have been made to Parts IV and VI. The author has dealt with those individual substances which illustrate as far as possible the general methods and principles. Consequently prominence is given to synthetic reactions of general application. The sections relating to the sugars, cyanogen and its derivatives, urea, uric acid, and amino-acids are very complete, and contain much useful information. A useful feature of this book is the section devoted to essential practical exercises; under this heading the author has included qualitative and quantitative analyses of the substances with which students are brought into contact. We can cordially recommend this manual to students of medicine and others commencing to study chemistry. It contains much theoretical and practical material both inorgonic and organic. There are sixty-four illustrations, and the subject matter is compactly and clearly treated.

Hygiene of the Eye. By Professor Wm. C. Posey, B.A., M.D. Philadelphia and London, 1918: J. B. Lippincott and Co. Pp. 344. Price 18s.

All are agreed that sight is the most valuable of all the special senses, and the author in his excellent work describes and gives sound advice in language as free from technicalities as possible, how it may best be preserved, and the relation which the organ of vision bears to the general economy. The information given by Prof. Posey dealing with the refraction of the eye, the illumination and equipment of the school room and the general care of the eyes of the scholar will prove of much interest and utility to teachers and parents. Blindness and the diseases and conditions leading to it are fully discussed as well as the National movements which are being made towards its prevention. For those engaged with the problem of lessening the number of industrial ocular injuries, a special chapter on industrial injuries of the eyes has been contributed containing practical information for their prevention for workmen in foundries, factories, and other trades. Four chapters have been written by distinguished specialists which will appeal to ophthalmologists. The author has by his work made a valuable contribution to eye hygiene. There are 120 good illustrations throughout the text.

Trench Fever.—Report of the Commission of the American Red Cross Medical Research Committee. London, 1918: The American Red Cross, 32, Grosvenor Gardens, S.W. 1. Prepared for publication by Major Richard P. Strong, A.E.F.

This very valuable report on trench fever, comprising 446 large pages, has recently been issued through the Medical Research Committee of the American Red Cross. The subject matter is divided into fourteen chapters, the first of which gives the scope of the investigations and the conclusions reached. Then follow chapters on our clinical knowledge of the fever, its specific nature, occurrence and nature, etiology and method of transmission. Chapter VIII contains interesting detailed information of the bacteriological study of blood, fæces and urine in trench fever cases, and of volunteers employed before infection. Many experiments with the *Pediculus humanus* are recorded in other chapters, as also on the filterability and thermal death-point of the virus There are numerous charts, diagrams and tables, and some excellent plates. This is a most valuable and exhaustive report on a disease occasioned by the war, about which little

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was known. Major Strong and his collaborators are to be cordially congratulated upon the completion of their careful and laborious researches and their contributions to the alleviation of the sufferings of mankind occasioned by war.

Poliomyelitis in all its Aspects. By Professor John Ruhräh, M.D., and Erwin E. Meyer, M.D. Philadelphia and New York: Lea and Febiger. Pp. 297. Price 8.25 dols.

In this volume the authors have collected the various facts concerning the disease as known up till now, and they have briefly given such theoretical considerations as may be considered interesting or important. Of the diseases of the nervous system, poliomyelitis has attracted more attention than any other, and since the great epidemic in New York in 1907 outbreaks have been reported yearly in various parts of the United States. We owe much to American investigators for elucidation of its pathology, and for perfecting its orthopædic treatment. The chapters on the nature of the virus and the epidemiology of the disease are deserving of special mention, and the inclusion of a chapter on the technic of lumbar puncture will prove very acceptable to practitioners. The literature of poliomyelitis comprises over 3,000 articles, which are being added to daily; the authors have admirably succeeded in their task and although there exist many monographs on this subject, few have considered in so thorough a manner every aspect of this disease. There is a copious index, 118 engravings and two plates. The publishers are to be commended for the clearness of the type and excellent illustrations. The authors are to be congratulated upon having produced such a concise and complete account of a disease which has been the subject of much research work during the last ten years, and the literature of which has been extensive.

Rural Water Supplies and their Purification. By Sir A. C. Houston, K.B.E., M.B., D.Sc. London, 1918: John Bale, Sons and Danielsson. Pp. 136. Price 7s. 6d.

The publication of a work on water supply for rural dwellers will be welcomed by many inhabitants of more or less isolated districts in which public water supplies are not available. These private supplies, obtained from rain-water or water from shallow wells, rivers or lakes are frequently polluted, and being outside the direct control of public authorities, become a source of potential danger to health. The subject matter is divided into eight chapters; the first three are devoted to the study of rain-water, and much useful information is given as to the chief methods of sterilizing and purifying waters. Chapters IV and V deal with well-waters, springs, rivers, brooks and lake-water. In Chapters VI and VII the results of actual experiments are continued, whilst the concluding chapter gives a description of the various apparatus, and miscellaneous information on cleaning of filters, lime, chlorine, chemicals, &c. A most useful feature is a summary in advance, and concluding remarks at the end of each chapter. Sanitary inspectors in country districts, medical officers of health, those living in rural districts, and public health students, will find this book very useful, and a trustworthy guide, as it is written by one of our leading water experts.

Race Regeneration. By Councillor E. J. Smith. London, 1918: P. S. King and Son. Pp. 223. Price 7s. 6d.

Bradford has for many years been in the vanguard of work for children, serving as an example for other municipalities, and the author, who is Chairman of the Health Committee of the Corporation, is perfectly equipped with the technical detail and overflowing with useful suggestions for the future development of this civic work. The book contains a chapter on a Ministry of Health, and a detailed description, with excellent illustrations, of the Bradford Maternity and Child Welfare Scheme and the Bradford Post-war Housing Scheme. It must not, however, be thought that the book has merely a local interest, for such national questions as the endowment of motherhood, the race suicide brought about by venereal disease, the poverty of our educational system, and the effect of industrial conditions upon the great mass of the people are ably and sympathetically discussed.

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Volume XXVII. MARCH, 1919. No. 3.

CONFERENCE ON THE PREVENTION AND ARREST OF VENEREAL DISEASE IN THE ARMY, AT THE ROYAL INSTITUTE OF PUBLIC HEALTH.[1]

Chairman: The Right Hon. Lord SYDENHAM of Combe, G.C.M.G., G.C.I.E., G.B.E., F.R.S.

The CHAIRMAN: The War has given a tremendous impetus to the progress of science. We quickly discovered in 1914 that a large proportion of the raw material and other products essential to the supply of the armies were entirely in the hands of our enemy, and it became necessary, at the shortest notice, to discover new processes and to start new industries. Our men of science and our leaders of industry rose to the occasion, I think we all feel, most splendidly, and they showed that they could beat the German in some of the fields which he seemed to have made almost his own. We now have the means of creating some large new industries which will in the future enable us to be independent of a great many of the imports that we used to receive from Central Europe, and most important of all, to my mind, is the promise of the future. British science can now, if we are wise and use it to the best purpose, come into its own and play a tremendous part in the great work of reconstruction which lies before us. Medical science in every branch has been powerfully stimulated by the War. The work done in the field has been quite admirable, and we now know that we have gained victory over some of those diseases which used to cripple great armies in the past. We have not only made a great advance in surgery, in bacteriology and practically in all that comes under the head of prevention; but beyond that we have gained insight into the direction in which we must move and in which further research is necessary, and we see much that is possible lying straight out before us. I think we understand better than ever that medical science and sound administration must always go hand in hand, and that together

[1] The Conference was held in connection with the Venereal Diseases Department of the Institute, January 8, 1919.

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they can produce an immense improvement in public health. I believe also that we realize now more than ever before the connexion between public health and the happiness and prosperity of the people. A Ministry of Health, as you all know, is now in prospect and it can do immense good service, but I think only on two conditions. In the first place, it must promote, assist and utilize to the utmost, medical research in all its branches; and, in the second place, it must create the most efficient machinery throughout the country so as to bring the benefits of science straight home to the lives and the homes of the people of this country. I think that in setting up that Ministry of Health we must be as careful as possible to avoid setting up any imitation of those great bureaucratic institutions which have risen up too freely like mushrooms. I consider that the lectures and discussions organized by The Royal Institute of Public Health are most important and are certain to be very widely useful in this country. I may say that I am proud to be permitted to preside at the first meeting in the New Year. The subject of venereal diseases in the Army is one on which much light has certainly been thrown by the War, which has provided pathological experience of the greatest value. There seems also to be statistical information of all kinds which, if thoroughly analysed and brought together by an expert, would make a very important addition to our stock of knowledge on this most important subject. As we all know, the dangers of a wide extension of venereal disease on mobilization are very great, very real and come very near to us. In so far as the disease can be arrested in the Army it must be an immense gain and a protection to the civil population; but, on the other hand, there has been during the War a considerable increase of infection among the civil population, and that, of course, will create risks—and serious risks—to the demobilized men. I do not think that the aspects of venereal disease in the Army and in the civil population can be kept wholly separate; each acts and reacts upon the other in several ways. In dealing with disciplined units such as you have in the Army there are conditions which do not exist when we come to treat with the civil population. In the one case you may insist; in the other you have to lead and instruct in order that all measures you may propose will receive the intelligent acquiescence of the people. I do think that we have made distinct progress in recent years. The propaganda upon which the Council for Combating Venereal

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Disease has been engaged throughout the War is, I am sure, producing a change of public opinion in regard to the whole question of venereal disease; and more than that, we now have free venereal clinics in considerable numbers and are trying hard to extend their scope, and also to render them available during longer hours so as to work more for the treatment of the civil population. There are several ways of combating venereal disease, and we shall hear about them at this Conference, but we must not neglect any one of those ways. On the purely scientific side I think much still remains to be done and that there is need of some painstaking and careful research. As you all know, the specific organisms of syphilis and gonorrhœa were distinguished some time ago, but we do not yet know nearly enough about the life history of the spirochæte; and there are some phenomena in connexion with syphilis which are as far as I know, unexplained. Then, again, the treatment of gonorrhœa is not nearly so effective as we hope that it may become in time, and in some cases it even seems to resist our present methods. There is, I am sure, a wide field of research opening out before us, and I feel confident that that research, when it is carried out by the able men now working upon it, will provide us with new and powerful weapons of combating this disease.

We welcome here to-day some distinguished representatives of the gallant American Army which has lately dealt a death blow to Kaiserism. I believe that in the military and naval sense we must not speak of them as allies, but I do believe that they will be our strong allies in combating an enemy perhaps as insidious as the Germans. We are fortunate in having Colonel Adami, whose good work you all know, to address us this afternoon, and I will now ask him to open what I am quite certain will be a most valuable and interesting discussion.

LECTURE BY COLONEL J. G. ADAMI, M.D., F.R.S., C.A.M.C.

Whilst recently talking with an old friend of mine, engaged in a Government department recently demobilized, I asked him what he proposed to do next. "I am thinking," he said, "of retiring to some quiet spot and putting together a collection of essays upon the 'dead hand.' Returning to the old country after all these years, more and more each day there is being borne upon me the extent to which the dead hand of tradition and customary point of view presses upon society and represses logical and needed

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advance in every direction." And forthwith he launched upon a succession of modern instances.

I could not wholly follow him when he touched upon sexual relationships; with him I had to admit that physiologically the human male is intended to be polygamous, whereas the social code demands that he be monogamous. But his deduction that therefore the social code was wrong, and that we should acknowledge and admit polygamy, failed, as I pointed out to him, to take into consideration the fact that the family constitutes the unit of society, our whole social and moral code being erected upon that foundation. Polygamy, I continued, has in the past been tried and found wanting, and to-day the Mahommedan nations which give a legal sanction to polygamy are nevertheless in general reverting to monogamy; the social environment of man to-day appears to demand that he be the husband of one wife. The real difficulty lay, not in society, but in the fact that man has not yet become physiologically adapted to his social state; the good of the family indicates one course of conduct, man's constitution impels to another. It is an evidence of progress that, as a community, we place the benefit of the family before the desires and comfort of the individual; but doing this we find ourselves in the dilemma that the performance of physiological function, save under the ægis of monogamic marriage, becomes regarded as anti-social, and an act which the individual in his heart of hearts knows to be in itself natural and desirable, has to be regarded and taught as contrary to good morals. We find ourselves indeed torn asunder between Peter and Paul, the Peter that is within us teaching us that what God has given us is clean and to be enjoyed; the Paul that woman is a snare, and that even a bishop should have but one wife—and scarcely that. And as youth is largely irresponsible, and the sense of social duty is a plant of slow growth, which in some is throughout life choked by the weeds of personal predilection, it has followed that the whole matter of sexual conduct has for generations been surrounded with an atmosphere of insincerity, not to say hypocrisy. We give lip service to public duty, the majority of us strive to uphold the social law; but I imagine that even the best of us, be it in thought, word or deed, cannot as men wholly throughout our lives escape from the dominance of our natural passions—that is, if we are real men, healthy and virile.

It is the instinct of this insincerity, which in the past has per-

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meated the whole treatment of the matter, that makes it so difficult for most of us to take up the public discussion. In its incapacity to reconcile the physiological and the moral aspects of the subject, the British public and its leaders have sought the solution of silence, of proceeding as though the problem did not exist; they have written themselves down—ostriches. Here it is that the dead hand comes in, the dead hand of a training begun in early childhood whereby we have been taught to regard the open discussion of sexual matters as "taboo"; the dead hand of school-boy "form," according to which public acknowledgment of one's standing in relationship to moral matters, save on the part of those who have donned the cloth and become professional moralists, brands one as either a prig or a humbug. Happily we are passing out of this phase; the Royal Commission in the first place and the forcible and courageous pronouncement regarding syphilis on the part of the *Times* in its leading article of January 4, herald the ending of the old regime of silence, concealment and taboo.

What this policy, this submission to the dead hand of custom has cost the Army and the country during the last four years is awful to contemplate. For our salvation as a nation and an Empire we have needed the services of every available man; have needed them at the height of their physical capacity. Time and again during the last four years, owing to our want of man power, it has seemed that the greater concentration of the enemy forces must result in a break through our lines, and bring ruin to us. Even without such a break our losses in man power have been huge, and to-day it is the A1 men who have survived whom we most need still as A1 men to be the fathers of sound and fertile families if the country is to maintain its ascendancy in industry and influence.

But what has actually happened? Year by year before the War the annual report of the Director-General warned the Government as to the prevalence of venereal disease in the Army; a quarter of all admissions to hospital was due to this; no other condition in peace time competed with the venereal diseases in lowering the efficiency of our soldiers, and it was a commonplace of military knowledge that in war time the prevalence and the loss of efficiency from this cause had in the past undergone a rapid increase. Lord Kitchener, it is true, in a notable communication addressed to the soldiers of the little old Army, asked them to respect the womankind of our Allies

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overseas. But not a step was taken to protect our men at home. With camps being created all over the country no steps were taken to render the regulations against harlotry more rigid. Our men have throughout the war been in venereal hospitals not by companies but by battalions. Each case has meant two months or so on the sick list, and weeks and months before the individual has been restored to full vigour at the Front, if, indeed, there has not been left a legacy of rheumatism, eye disease, and enfeebled general health. The policy of the ostrich was maintained. Before the war the Government had appointed a Royal Commission upon Venereal Disease, and having done this appeared to think that it had more than done its duty. Do not misunderstand me; the National Council for Combating Venereal Diseases accomplished a notable work in strengthening the hands of the Royal Commission; the Commission itself performed a service of the first order; and the Government did well in acting immediately upon its Report. But the Report and the Act did not contemplate war conditions and the soldier. This I know, that when in the autumn of 1914 the first Canadian contingent arrived upon Salisbury Plain it very rapidly found that the common law of England and the military law were equally impotent to cope with the condition of affairs revealed. Here, again, do not misunderstand me. I do not mean to suggest that whatever the good women at home may have thought regarding the virtue of their sons and the vice of the British harlot, the Canadian soldier was either better or worse than the British or the Australian, or the New Zealand soldier. Let me be perfectly frank. We have as a matter of fact discovered that of the cases of venereal disease among Canadian soldiers admitted to hospital in England at the time when periodically new drafts were being received from across the Atlantic, as high a proportion as 25 per cent. of all admissions were of active infections acquired in Canada —were admissions from the new drafts. But what I mean is that the heads of the Canadian Service here in England were responsible to the Canadian people for preserving the health of their men. They were responsible to the mothers of Canada. To their surprise they found that harlotry in England is a protected profession, but not a controlled one.

Here again, do not misunderstand me; to a large extent the same is true of Canada; there also the policy of the ostrich has prevailed, and the police have tacitly sanctioned the traffic. But

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things are altering. Only recently the Commission upon Conservation has published a report upon venereal disease in Toronto, and the Committee of Sixteen another upon vice in Montreal, and these have profoundly stirred the people. In England in war time I confess that the Canadian authorities expected immediate and willing help from the local and London authorities in protecting the soldier, and help there was none. Each week-end there poured into Salisbury from London from eighty to one hundred loose women; the railway company was impotent to prevent their journeying; the police at Salisbury could not turn them out of the town; the Wiltshire magistrates could or would do nothing; at most the military police could declare houses of ill-fame within the camp area out of bounds, and turn women out of the camps proper. It took the better part of two years before the Government utilized the powers granted by the Defence of the Realm Act, and in 1916 for one special military area where there had been a large outbreak of venereal disease, empowered the competent naval or military authority to transport out of the area those directly or indirectly concerned in the profession of prostitution. In the meantime all that that most admirable Association, the National Council for Combating Venereal Disease could suggest as an antidote was talk—the provision of lectures and the instruction of the soldier: this along with the provision of opportunities for recreation. I believe that I am correct in saying that it took them the better part of three years before they openly recommended their lecturers to advise early preventive treatment after the act, so heavily did the dead hand of Mrs. Grundy press upon them.

I shall never forget my attendance along with my chief at a meeting of that Society in 1916. Perhaps some of you have heard the story of how in the early part of last century grave accounts reached Edinburgh regarding the drunkenness of the further Highlands, and of how the General Assembly determined that it was their duty to send north a missionary to preach temperance; and the missionary went and in due time returned and appeared before the Assembly. Said he, "I have had gran' success." Said the Moderator, "What mean you by gran' success?" "Weel," replied the missionary, "ye must know that I found the seetuation simply awfu', but I wrestled with the puir misguid-it folk and as a result of ma meenistrations they have sworn to ameliorate their habits, and no' to tak' mair than one dram of whisky before breakfast the

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morn." The worthy chairman at this meeting, now no longer with us, told in all seriousness the anxiety and trouble that one of the great Canadian camps of 40,000 soldiers and more in the south of England had given the Council; how they had wrestled with the difficulty, how they had wanted to put the Defence of the Realm Act into force, but feared that action against their frailer sisters would rouse the suffragettes into militancy; how for months they had appealed to the Mayor and Town Council of the near-by town to take action, but without success, until now, when he had the glad news to impart that finally they had prevailed upon the borough magnates and a new era was opening; the Mayor and Council had consented to appoint two women policemen! Two women policemen to protect the morals of an army of 50,000 men, by influencing for good the harpies that preyed upon them! Nor shall I forget the just impatience of my chief on that occasion, and how he fluttered the serenity of that meeting; how he put it to the Council that here in the greatest of world wars, dealing with the greatest of army plagues, for the last two years they had been nibbling at the fringe of the subject, talking and talking but accomplishing nothing fundamental; how London is the great centre of prostitution, the hotbed of venereal infection for both officers and men of other ranks on leave, but the Council proceeded as though London conditions did not exist; how at that moment, but a few yards away from the meeting, enter one of the music halls and they would find the promenade packed with prostitutes, openly soliciting. Whether his words had the effect I cannot say, but within a week the public-spirited manager of the Empire announced that his promenade henceforth would be closed to women, and the other music halls followed suit.

Now I am convinced that this policy of frank dealing and open speaking is the only one that will improve conditions. Thus had the medical profession and the National Council, and the Government spoken out at the beginning of the war, the well-being and happiness of the country and the condition of our troops would to-day have been very different from what it is. Even at this late date I would beg the National Council to influence the Government to publish a statement regarding the venereal situation in the Army in successive years of the war, in the different regions—at home, in France, Mesopotamia, and the like, so that the country may know the extent of the trouble as it affects the Army, and simultaneously to

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obtain powers to make an investigation in selected areas or classes of the population into the frequency of either syphilis or venereal diseases in general in those areas or classes. Let the situation be known and faced. I am convinced that the upholders of the policy of bated breath, the ostrich policy, once they begin to think over the matter recognize the unreasonableness of their attitude, and that their opposition is not to be feared, even by the politician anxious for votes. Of this I am convinced from experience. For notice—Mrs. Grundy and the prudes are far more in evidence in the United States than in this country. We, for example, have never condescended to speak of "roosters," or thought it improper to mention the lower extremities by their Anglo-Saxon name, or to drape the anterior continuations of the piano. But this notwithstanding, the Surgeon-General at Washington did not hesitate in 1912—before the war began—to publish in his Routine Orders outspoken regulations directing all soldiers returning to camp to state whether they had exposed themselves to the possibility of venereal infection, and detailing the early preventive treatment to be given to those who had been exposed. I may say that I studied the American treatment at Washington in the spring of 1915, and reported upon it to the War Office, but the dead hand prevented its adoption for close upon two years. Yet if this could be accomplished in the States in times of peace, we in this country need not have feared to adopt it in time of war. When in 1917 the States actually came into the war, the whole country took up the matter. The Secretary of the Navy, for example, did not hesitate to announce, "To-day as never before American manhood must be clean and fit. America stands in need of every ounce of her strength. We must cut out the cancer of disease if we would live." The Secretary of the Army was equally direct. General Pershing, as Commander-in-Chief, has made it one of his army regulations that the venereal status of a unit shall be filed with the other papers of the officer commanding each unit, and shall be taken into account in determining the promotion of the officer. To quote Major Haggard, President of the Southern Surgical Association, "The inevitable pestilence is being fought with every imaginable agency—education, recreation, diversion, protection, isolation, prophylaxis, penalties and court martial. Many thousands of young men will for the first time be taught the whole truth by all sorts of real men. . . After the war the idea will

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permeate all strata of society, and be a real understandable and livable benefaction. It will disseminate through America the practice of personal hygiene by uncounted numbers of young men. The beneficial results to accrue to us and to posterity will almost make the war worth while." But Colonel Hugh Young of the United States Army is with us, the well-known head of the genito-urinary department at Johns Hopkins Hospital, America's foremost authority on venereal disease, and with him Lieutenant-Colonel W. F. Snow, who is largely responsible for the administration of anti-venereal measures overseas. They will put before us what has been accomplished and how. Thanks to Colonel Waley, U.S. liaison officer at the War Office, and with the permission of the Commander-in-Chief, they have come from France to attend this Conference.

With their important communications in view, I will be brief regarding the methods in vogue of the Overseas Military Forces of Canada. I have already indicated the difficulties in our way due to want of active co-operation on the part of the civil authorities in Great Britain. In practice we have found that *there is no one procedure which is effective in arresting venereal disease in the Army; it is necessary to employ a combination;* the Director-General has put into force all the methods save one (court martial) mentioned by Major Haggard: education, warning, recreation, diversion, protection, isolation, prophylaxis and penalties. Let me indicate the main points of our activities. One of our leading Canadian hygienists, Colonel Amyot, Professor of Hygiene in the University of Toronto, has been attached by the Director-General to his office and given special charge of the venereal situation, with a keen worker under him, Captain Gibbs, C.A.M.C., whose whole time is devoted to investigation and propaganda work.

(1) *Inspection.*—Emergency inspections are held once every week. By emergency is meant that they are held without previous notice. (2) *Education.*—On joining up, on arrival in England, and periodically throughout his service, the soldier is instructed regarding personal hygiene, the need to the nation of personal efficiency, the value of continence, the dangers to himself, to his future family, to those around him, of venereal infection; the mode of infection; the nature of gonorrhœa, syphilis and chancroid, and their results. That the instruction may be given in proper form, and nothing

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essential be overlooked, a syllabus of five lectures on the prevention of communicable disease has been issued from the office of the D.G.M.S. to every medical officer of units in England, the course to be delivered to officers, N.C.O.s and men in definite groups each week until the course is finished. The men are instructed straightly that intercourse with the other sex is not essential to health, that for a man to expose himself to the danger of venereal infection and become infected is knowingly to acquire a self-inflicted wound which, as much as any other self-inflicted wound, should render him liable to court martial. If despite these warnings the temptation to intercourse is too great, then for the good of the Service it is his duty to protect himself so far as this is possible. He is instructed how this may be done, nay more, is told that, in their own interests and his, the Army authorities provide him gratis with calomel ointment for *prophylactic use*, and lastly, he is instruoted to report for treatment as soon as possible after the act. (3) *Early Treatment.*—Every Canadian orderly medical room in England is an early treatment centre open night and day; there is present a trained N.C.O. to supervise and see that the soldier carries out fully the instructions given. Those instructions, in clear language and clear type, are set forth on the walls. When one of the trained N.C.O.s seeks, or is given, transfer to other duties his successor is appointed a week in advance, so that before taking over the duties he may be thoroughly informed. For those on leave in London there are open day and night two early treatment centres, at Southampton Street and at Victoria. For those exposed, another treatment is given on their return to their units. Men are further instructed that if not in the neighbourhood of a Canadian centre they are to go to an Australian or New Zealand centre. As a matter of fact the Dominions are working together and are appointing centres in the large cities of the United Kingdom open to men from all the Dominions. In Paris also is a Canadian centre open to soldiers from all parts of the Empire on leave in that city.

Here it deserves note that, contrary to the optimistic and I hold dangerous statement contained in the leading article of the *Times* of January 4, the Canadian authorities in their talks to the men on parade make a point of emphasizing that *neither prophylactic nor early treatment assures absolute immunity to venereal infection.* The men are warned that this is not the case, the experience has

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shown that even under expert supervision neither the one nor the other procedure is free from occasional failure. In this connection the Canadian authorities are at one with Mr. E. B. Turner in his letter to the *British Medical Journal* of January 4. They firmly believe that if the Army—and the populace in general—be advised that absolute deterrents exist when this is not the case, there is a possible danger of their employment leading not to diminution, but positive increase in the spread of venereal diseases. This, I understand, has actually happened in Germany. We have, it is true, no official statistics to bring forward in the matter, because for the good of the Service and to encourage the men to apply for treatment at the Orderly Room no names are taken. (4) *Penalties.*—By an Order in Council issued in 1916, the Governor-General directed that half the pay of soldiers found suffering from acute venereal disease should be docked, so long as they remained on the sick list, and this is strictly observed; during convalescence the men are given fatigue duties. Add to this the venereal record is inserted on the Medical History Sheet, and accompanies the man throughout his Army career and is brought before the Pension Commissions.

(5) *Treatment.*—This is not a medical lecture, so I shall not enter into the details of the treatment given at our two Canadian special venereal hospitals, full of interest as they are for the expert. I would only point out that at both of these hospitals from the first possible moment the men, instead of being treated as being in Coventry and as depraved characters, are treated as human beings. I have it from one of our chaplains that as a body he found them the best and brightest and most attractive lot of fellows he had come across in the Army, and that he treated them as such. As part of their treatment they are kept diverted; football, baseball, and other teams, are a feature of the camps and there is keen rivalry between the teams from the different wards. Contrary to the generally accepted view that acute gonorrhœa is best treated by avoidance of exercise, the experience of the special hospital at Witley Camp has shown that physical training, by keeping the men busy and diverted, very materially shortens the period of hospitalization. The effects obtained were so good that in the report of his inspection Major-General F. Howard, Inspector of Infantry, recommended to the Commander-in-Chief that the Witley methods be employed at all Military Venereal Hospitals,

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as tending so greatly towards military efficiency and saving so much time in training.

Results.—Lastly as to the results. I will only trouble you with one set of statistics, but that, I think, shows eloquently the effect of the campaign undertaken by the Director-General through Lieutenant-Colonel Amyot and his staff:—

During the month of September, 1916, from nearly 42,000 Canadian troops in Great Britain there were admitted to hospital suffering from venereal disease 960 cases, practically a battalion; during the month of September, 1918, from among 110,000 Canadians in Great Britain, there were 750 similar admissions. In two years the venereal incidence has been reduced more than 66 per cent.; it stands now at less than the third of what it did two years ago. Had they continued at the same rate the admissions during the month in September, 1918, would have been not 750 but over 2,500; not seven and a half companies, but two battalions and a half out of action.

Inevitably during this period of armistice with beginning demobilization we are dreading a more serious and sinister increase in venereal disease throughout the country, as the result of the return of the soldier; dreading its effect upon the family. I know that the agitation has already begun in Canada; that there it has been urged that no soldier suffering from gonorrhœa or from syphilis shall be permitted to return to the Dominion, but that such shall be kept here in England in hospital until wholly cured—an impossible recommendation, seeing that cases of chronic gleet and some cases of tertiary syphilis so far fail to react to any known form of treatment. What is suggested, therefore, is that a certain percentage of Canadian soldiers be kept in hospital in England for the rest of their natural lives.

It is not the civil population that has to fear the soldier, but the soldier the civil population. Throughout the war the soldier has been well cared for, all means have been employed to diagnose venereal disease at its very onset, and to give hospital treatment immediately. It is then that disease is most easily controlled.

Every soldier has been warned time and again of the dangers he runs, has been instructed as to personal hygiene, and has been afforded early treatment under supervision. As a result there is no section of the community which at the present time is in a cleaner and healthier state; no section of the community which

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has less venereal disease; I speak here for the whole body of the Imperial Forces. As for our Canadian experience I may say that this autumn the instruction was given that all soldiers returning to Canada whose medical history sheets bore the record of venereal disease, should be given the Wassermann test. I have the August figures, showing that 2 per cent. of the total number returning reacted, and all these were tertiary, non-infective cases, for no active primary or secondary cases are permitted to return. The average number of reactions in the civil population is estimated at from 8 to 12 per cent. There is four to six times as much syphilis in the civil population as in the Army. But in the meantime nothing of any moment has been accomplished for the civil population. Lord Sydenham in his letter to the *Times* of January 7 speaks of the provision of early treatment centres. "We are endeavouring," he says, "to secure the organization of clinics continuously available where early treatment by competent persons can be obtained." But they are not available to-day; they will not at the present rate be available until demobilization has become a matter of history. To meet the situation they should be scattered thickly all over the country; a man must not have to take a two hours' journey after the act—he certainly will not take it; the dearth of expert syphilologists and of bacteriologists qualified to carry out the delicate Wassermann and other complement fixation tests demands that the centres for ordinary venereal diagnosis and treatment under the Act be few and far between, situated in the great centres of population. It is thus the civil population that to-day constitutes the grave danger. And as all these four years nothing has been done to meet the emergency, when our soldiers return and are feasted and made drunk and are solicited and fall, there will be no medical orderly room to proceed to, no provision of early treatment, no N.C.O. to see that the elaborate toilet is duly performed. Provision for early treatment will be non-existent. The preventive treatment provided by Lord Sydenham would, at very best be applicable to a fraction of the population.

Let me repeat, the soldier will receive and not give, and speaking as a soldier and for the soldier with full recognition of the strength and the seriousness of the argument put forward by Mr. Turner and Lord Sydenham, and admitting that the provision of prophylactic treatment to an uninstructed public may well

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result in the spread rather than in the reduction of venereal disease, I am strongly of opinion that the soldier before demobilization should be provided with the means of prophylactic treatment, should be advised where and how to obtain "tubes" without difficulty, and moreover, be given precise detailed instructions as to the method of employment. For the good of the country I see no other possible course.

I have spoken frankly. I have here taken a position that on first consideration may not receive the unqualified support of those others who, like myself, realize the vast harm done to the manhood and womanhood of our people, the hideous heritage of disease to this and coming generations—where indeed there does not result sterility or the dead or diseased untimely fruit of the womb: the appalling loss of man power that result from the present state of affairs. But to those who, in the supposed interest of morality, would still maintain the policy of silence and would accuse me of propounding an unmoral, if not immoral, policy, I would only repeat what I said in Westminster in July to the National Conference upon Maternal and Infant Welfare: "Which is the more immoral act, to advise a man how to prevent infection if he has transgressed the moral code, or calmly and coldly to look on without moving a finger while, through ignorance on his part, the innocent wife and children are made diseased, and they and the community suffer through generations?"

And as to this vital problem of the provision of prophylactic or early treatment respectively, which to-day is so stirring us: I cannot recognize any logical intermediary position between regarding as a leper outside the pale of society, the man or the woman who has become infected, and approving of treatment before the act. We cannot take the first position and decide that as the man makes his bed so he must lie upon it, and that because his wife also occupies the bed: she must be protected. But if we, therefore, are compelled to treat the disease, the earlier we treat it the surer we are of controlling it; infection is present from the moment the infecting agents begin their action upon the tissues; it is ridiculous to wait until they have set up lesions recognizable to the naked eye. If it is justifiable to treat the developed disease, it is yet more so to afford early treatment; and if that, then, for security, to make it the rule that after every illicit intercourse the man seeks protection. To direct, as did

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certain memorable dead hand instructions, that preventive treatment must be given in the presence of a bacteriologist after the gonococcus or the spirochæte have been found actually present upon the organs of generation and recognized under the microscope, is what across the Atlantic is termed "eye wash." And if, as the writer to the *Times* on January 2 put it, the critical hour is 11 p.m., and treatment may justifiably be given at 11.15, what objections can be raised to giving it at 10.45? The doctrine that, "the sinner must not prepare for immorality, but he may use the best means known to science to escape the consequences"—such a doctrine surely, if not hypercritical, is hypocritical. But we are not a logical people, and the probabilities are that we will end in some illogical compromise. Yet, unless something be done, and that immediately, the next few months will see such a spread of venereal disease in this country that for generations the Empire will suffer. Now, if ever, it is well to repeat His Majesty's famous exhortation, "Wake up, England!"

The CHAIRMAN: I am glad to hear from Colonel Adami that it would be very wrong and dangerous to suggest to any man in the Army, or any person of the civil population, that either prophylaxis or early treatment was an infallible remedy; and he went so far as to say that if that theory gained credence it would probably result in an increase of infection. I entirely agree with those views which correspond exactly with such opinion as I have. There is one little mistake that I thought he made. He said that during all this time the International Council had done nothing but talk. Of course, he has heard the talk but does not know what goes on behind the scenes, and in these days it is only the people who talk most who are considered to be exercising a great deal of activity. But I can assure him we have been trying for a long time to secure that the military areas shall be cleared of improper characters. More than two years ago I went to discuss that weighty matter at the War Office, but I am sorry to say I was not successful. Therefore, I hope Colonel Adami will not think that we do nothing but talk. I will now call upon Colonel Hugh Young, of the American Expeditionary Force, to address us.

Colonel HUGH H. YOUNG, Chief of the Division of Urology, American Expeditionary Force: At the request of General Pershing some two years since I undertook an investigation into the problem of venereal disease as concerning the popu-

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lation of England and France and our Armies. I had the great pleasure of spending six weeks, first in England with the British Army, followed by six weeks with the French Army and with our experts studying the situation among the civil population in France. It was then incumbent upon me to present to General Pershing some scheme which we could adopt for the American Army as a military unit in its relations with the French population. You all know the terrible situation in the various cities, you all know the horrible history of infection to incoming troops; you know how women were simply carried off their feet, and many who had been straight became crooked, and many previously uninfected became infected; how the disease spread rapidly among the civil population, when no precaution was taken, and how rapidly it increased among the troops. Statistics, more or less inaccurate, but largely true, indicating the amount of infection in newly-organized bodies of men among the soldiers were published, showing that a large number of them became infected. It is said that in certain units the amount of loss of man-power as a result of venereal infection was greater than in some of the most sanguinary encounters. In dealing with this proposition we brought with us from the United States methods already in vogue there. First of all, as to the work in the Army and Navy. Following the discovery by the Institute Pasteur in 1906 that the effect of syphilis could be prevented apparently, experimentally, by the use of calomel ointment, the Army and Navy in the United States had adopted prophylaxis as a standard medical doctrine, enforced by the strictest military orders. In the five years following 1912, during which our Army carried out those methods, venereal disease was reduced by nearly 50 per cent. In a lecture which I gave on the ship "Baltic" to General Pershing and his men it was possible to show that there had been a tremendous reduction in typhoid, a tremendous reduction in malaria, the complete eradication of yellow fever, the reduction of alcoholism in our Army by 50 per cent., and very nearly the same reduction in our Army of venereal disease, but that there was still a very considerable amount of it. And it was pointed out that it ought to be possible to improve upon the methods in use. On our arrival in England we at once saw the great danger of a city like London and ports of debarkation like Liverpool and Southampton, and after careful study we decided to avoid allowing our troops to come to such

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centres. They were kept in Liverpool or Southampton for an extremely short time; they were, so to speak, kept behind barbed wire so that they could neither get at the women nor the women at them. This plan has been carried out as effectually as possible, and most of our troops have been rushed through England. Though we would like to have had them see the cathedrals, &c., we thought the women too dangerous. In France we found it not quite so easy to regulate prostitution, but having had considerable experience we realized that nothing could be lost trying to do so. We found in France very much the same situation, and carried out much the same plan. Very early after arrival in France the first important general order that General Pershing issued was one on venereal disease, calling upon his men to be continent, showing them they could be good soldiers and get along without women, explaining that it was their duty to their country, having come at such great sacrifice and such long distances, to keep themselves fit. He then dealt with the military grounds of prophylaxis and the absolute necessity of a man using prophylaxis. And for the first time he promulgated an order that where a man acquired venereal disease he would *ipso facto* be tried by court martial and fined, and otherwise punished, regardless of whether he had used prophylaxis or not. That procedure is not yet adopted in the United States, but after a conference with medical men General Pershing was so confident that prophylaxis was almost always successful, that if a man came with venereal disease and said he had not used prophylaxis, the General, because he had not used it, punished him. Besides that, we felt that if a man took the chance of getting venereal disease he, at any rate, should be punished for getting it. There was great opposition in our Army on account of that order. It was said everywhere that that would at once lead the men to give up the use of prophylaxis, and at first perhaps it did to a slight extent. But when they realized that prophylaxis usually prevented the disease, and that they were going to be punished when they got it, they used every possible effort to prevent it. So that the universal punishment of the men, regardless of whether they used prophylactic measures or not, which has been in vogue for over two million men, has turned out to be exactly the proper procedure. The first division that came over, by intensive work, lectures,

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propaganda, orders, and so on, acquired a very low venereal rate; probably one-third of what the rate was in the United States before entering the War. Other divisions then arrived in France and going through the ports to Western France, were immediately subjected to the dangers of the seaport towns. We had imperfect means of taking care of them, and the result was that we got a very large amount of venereal disease among some of the newly-arrived battalions. I was sent to investigate the matter and found that the houses of the prostitutes of the ports of France were really terrible places. In the town of St. Lazarre there were three brothels visited not infrequently by 100 to 500 men in the course of an afternoon or evening. These men passed through at such a rapid rate that it was not uncommon for a woman to stay with thirty or sixty men in the course of the evening. The French claim that all these women are healthy. They had examinations three times a week. We put them out of bounds. The authorities opposed us and carried the matter to their higher Government officials, claiming that these women were undoubtedly free from the disease because examined regularly. Probably their statements were more or less correct, but we demonstrated one very interesting and rather new thing, and that is that when men follow each other in such rapid succession the women become carriers of the disease rather than the holders of it. As we know, the majority of prostitutes acquire syphilis, certainly, during the first or second year. In the course of a year or two they arrive at a latent or tertiary stage and they themselves do not become transmitters of the disease. But those women through having intercourse with men with syphilis may easily become recipients of the germs and transmit them from one man to another. As a matter of fact, there was one house in which eight French soldiers were infected with syphilis, where the French themselves asserted that every woman was free from disease. But they found that the boy who opened the front door who cohabited with the women was himself in a very active stage of syphilis; he simply infected them periodically, and they passed it on to the soldiers. So that a house of prostitutes where soldiers pass through in great numbers is certainly, from the standpoint of syphilis, more dangerous because the women act as temporary carriers and pass the disease on to the soldiers who go through, therefore being sources of danger regardless of the most careful examinations made by medical men. That point

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I do not think has been dwelt upon before. In other words, modern medicine has shown that in the stamping out of organisms it is the carrier that is the dangerous person; the carrier of typhoid may be perfectly well; the carrier of pneumococci may also be well, and so with the carrier of venereal disease, and certainly in the great problem of houses of prostitution the carrier is the most important person. On my report, General Pershing passed a very stringent general order putting all those houses out of bounds, and immediately there was a marked reduction of venereal disease. It fell to $\frac{1}{8}$ per cent. among the troops lodged in St. Lazarre, and among the naval population it fell to $\frac{1}{12}$. As our experience shows, the problem is, of course, a multiple one in the Army as among the civil population. It is hard to touch upon all the phases of it here, but there is no question about it that educational propaganda showing the danger of it and stating the fact that sexual intercourse is not necessary for men who are leading active and healthy lives does not lessen the moral tone. None of our military authorities must in any way lessen the moral tone of the community; as a matter of fact I feel sure that education, and even talks on prophylaxis, do not in any way lower the moral tone of the troops. After men are instructed and understand the dangers and realize that although they have the prophylaxis it is not an absolute preventive, it is remarkable how many of them in the Army get along perfectly well without sexual intercourse. I have tried, as a matter of fact, in studies and talks with the men to get an idea of how much sexual intercourse is really indulged in, and certainly in a great organization not more than 10 per cent. indulge in it, but a large percentage do not, and have not during their stay in France, indulged at all. As to the efficacy of prophylaxis, we are absolutely agreed that it is wonderful in its efficacy if used properly. There is no question about it. The statistics show that if used within the first hour after intercourse only about $\frac{1}{10}$ or 1 per cent. of the men become infected, and that seems to be quite correct. In a series of 112,000 prophylaxis cases given in the City of Colorado there were failures in only $1\frac{7}{10}$ of the cases, and a great many of those men had used it after four and six hours. If used early it is really most effective in a great percentage of the cases. But you cannot rely entirely on prophylaxis. You have to get much help from the civil community and from the police and civil

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authorities. The situation in London is absolutely outrageous. There is no reason why the police should not take up women who are soliciting men all over the streets. The police know them; they are, as a rule, pals. Why should they not go up to a woman and arrest her? It is perfectly outrageous, and it has been a crime to the soldiers who were forced to come through London. We have, as I have said, kept ourselves away from London and Paris simply because we feel that if our soldiers are sent there they are subjected to abominable treatment on the part of the civil population. It has been very truly said by Colonel Adami that when our soldiers come home they will return an educated, well-trained body of men, clear of venereal disease, knowing its dangers and understanding the proposition, that a civil population is far more dangerous than they are. It is our duty to make that civil population less dangerous. The great problem, of course, is what to do. Undoubtedly the Civil Authorities ought to be made to do the proper and honest thing. The women who infect men are greater criminals than thieves, for what is the loss of a little money compared with the loss of the nation's health? It is practically the greatest scourge there is at the present time. All the great scourges have been wiped out except this. And why through ignorance, and the policy of silence and not acknowledging the truth, should venereal disease be allowed to go on? It is time we were getting up and doing something. I feel it as strongly as the Canadians and other members of the Overseas Forces. As to the practical points, certainly policing and the forcing of the civil authorities to do something is absolutely essential. It is a crime, an outrage; it has been one of the most heinous crimes committed, the way in which troops have been pestered and assaulted by the infected women of England and France. But suppose something of the kind is accomplished, something still more important has to be done besides the propaganda. We must take the means we know as medical men to prevent the disease, but I hope the idea will not go abroad that prophylaxis is, in all cases, effective; it is effective if used within the first hour, and used rightly, in certainly more than $89\frac{8}{10}$ per cent. of the cases. How can that be made to reach the civil population? It has got to be more or less secret, but at the same time widespread, so that any person can get it who wants it without exposing themselves to ridicule or to a lot of gossip and scandal. I believe by the use of auto-

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matic penny-in-the-slot machines that excellent prophylaxis could be distributed so that anybody could get it quietly and secretly. I do not believe that will demoralize or injure the civil population in the slightest degree. There may be a few who have held back from sexual intercourse owing to the fear of venereal disease, but compared with the tremendous advantage that would accrue to the civil population and the country which needs its man-power restored after the losses of the War, the disadvantages of any system of prophylaxis would be small. The decline of the birth-rate is due largely to venereal disease, not to any efforts to prevent children being born. You need to increase your birth-rate now, and it is your duty to your country to furnish this means which we medical men have proved will wipe out venereal disease. One could have in these machines small tubes containing calomel and some antiseptic, and it is possible by the use of that, with proper instructions, with a statement on one side of the page of which in regard to the great dangers of venereal disease and the advantage of continence, and stating that men can be real men and still be continent, and on the other side telling a man what to do in case he does not follow that advice—I believe that ought to be obtainable from machines put in public lavatories, barbers' shops, and apothecaries' shops, everywhere in public places where it could be got at more or less secretly. It ought, I think, to be possible to sell it for a penny a packet. If it is impossible to do that, the Government ought to contribute the difference. By the use of that means you will not only be able to spread a great deal of propaganda—because each one can be accompanied by an address on the subject—but I am confident if that could be made general use of, there would be a reduction in venereal disease in this country which you would not dream of as possible.

Lieutenant-Colonel WILLIAM F. SNOW, M.C., U.S.: I take it that you are interested, now that the Armistice has been signed, not so much in what we have done in the several Armies for the sake of the soldiers, but as to how that may be applied to our civil population. Our methods must have interested you, because it seems to me they have brought out a number of the questions you are bound to face in dealing with this problem in the civil population. I think all the speakers, and certainly those of us who have had to meet this problem administratively, would like to emphasize the fact that we may have had to do some things in the Army because of an

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emergency that cannot be applicable to civil communities. Yet we have wanted to place before the civil community day by day what we were doing in the Army, and to state both sides of the case. In the United States we felt that it was quite important at the beginning of our entrance into the War in April, 1917, to get the Government to declare a policy. We either had to decide that continence was compatible with health and was going to be a practical basis for measures in the Army or not. We could not wink at it. And so we went straight to the President of the United States, and the Council of National Defence, consisting of six members of the Cabinet, for an emergency order. We asked them to state what the policy was going to be and how our Army and Navy would be administered in relation to this problem. As a result of a series of Conferences, we borrowed from the report of your Royal Commission on Venereal Diseases the policy of having open meetings, and we gathered together at these, scientific men and women from every quarter of the country. We then presented the results to the Council of National Defence and secured a ruling that it would be the policy of the United States Government that continence was compatible with health and was the best preventive of venereal disease. That was to be the basis of our activities in combating venereal diseases in the United States Army and Navy. We then added to that the belief that if we were going to ask continence of the men during the period they should serve the Government as soldiers and sailors we must do something constructive in the way of providing an alternative or a substitute, I might say, for sex adventure; that consequently the Government would endeavour in every possible way to provide recreation and entertainment for the men as a counteractive to the entertainment and sexual excitement of the street and brothel. Then the Council specified that venereal disease is related to prostitution, and that prostitution is more or less dependent on the accessibility of the prostitute, and that consequently we would endeavour to follow the Council's plan of providing zones around our cantonments, and within those zones we would try to make prostitution impossible. Lastly, we specified in these regulations that venereal disease was such a serious cause of infectiveness in our Army and Navy that we would ask the Surgeon-General to deal administratively with the problem, and that we would undertake to educate the public in the sense of placing before them all

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the facts as they accrued in relation to our success or failure in dealing with this problem. First and last, we supposed this to be a question of the prevention of disease. As General Dorcas has said so many times, the problem of the Surgeon-General of the Army is to keep the largest number of men for the greatest number of days on the battle-ground. Venereal disease was one of the chief reasons why he could not make a record in that direction. Individually, we tried to state to the public that the Officers of the Government and the Officers of the Army were interested in the morale and in the morals of the men, but the measures we were undertaking in the field were based wholly on epidemiology. They either would enable us to cut down venereal disease or not. If not, it was purely a question of moral problems, and belonged to some other department than the Surgeon-General. It so happens in this problem that we have perhaps 90 per cent. of common ground on which both the moralists and the medical men agree. But we felt we made the greatest gain with our Army when we got the Government to declare its policy that any individual officer's opinion could not weigh against the published statement of the Secretary of War and the President and other members of the Cabinet. We have proceeded along that line. Starting, as we did, three years after the other armies, we have utilized their experience and tried to apply it. Perhaps the distinctive thing we have done is to go to the public. And there again we had the opportunity of having decided early that we would draft our men from the civil population, and that implied co-operation of the public of the United States. I should supplement that by saying we also decided we would take into the Army all the cases of syphilis and gonorrhœa which could possibly be utilized in a limited way in our military organization. Practically all but the invalids from this disease were taken into the Army. The result was that we had a very large venereal disease incidence. As part of our policy of telling the public the facts, we then made an appeal to the United States that in future drafts, as we expected to draw our men rapidly, we were depending on the care with which the civil population exercised the control of its community and the possibility of infection amongst the young men who would be our soldiers. We furthermore stated—and it is entirely true scientifically—that our soldiers do not get infected in the Army; they get

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infected in the civil community. To the amazement of some of us we found the public perfectly ready to accept all these facts, and they asked us to tell them what to do to help the Government win this War, and tell them how they could better their civilian conditions. I think it rather amazing that the public did not oppose any of this programme. When Congress was asked to declare zones within which alcohol and solicitation and houses of prostitution could be excluded, we thought there would be some objection. There was none whatever. When at a later time we asked Congress to appropriate four million dollars to provide for dispensaries and diagnosis treatment in aiding the States through State subsidies, much on your plan in England of providing the grant allocated to dispensaries, we thought there would be some difficulty. But Congress did not object, and the Congressmen represent the people. The people are going whole-heartedly into this programme. I think the reason for that is that we have convinced the majority of those interested, that there is no conflict between morals and public health in a problem of this description. As Health Officer I have said that whenever a public health measure and a moral measure come into conflict, the public health measure will always get left. That is because—certainly in the United States—the American public is more concerned in safeguarding the moral standard it has built up through the best channels than in the individual health of its citizens. But granted we explain to the public that there is common ground on which we may conserve our moral standards and at the same time increase the health of the population, then the entire United States is behind that programme. The question of prophylaxis has been mentioned, and I wish briefly to refer to it. We have used, as I have said, recreation and entertainment first. We established in the Army the War Departments Commission of Training Camp Activities in order to administratively control this vast problem. We secondly passed a law of enforcement, making prostitution inaccessible to the men we could not hold by entertainment and recreation generally. We found they were willing to do things but did not know how. The police have been mentioned, and I am convinced from my experience in the United States that they are willing to do things if someone will lay down their part in dealing with this problem. We appointed a Sanitary Corps in the Medical

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Department, and have something like one hundred men stationed over the United States studying this problem. It seemed to many business men in the United States a curious thing that the War Department Medical Service should recruit young lawyers as lieutenants and captains and then send them out to stations in a community like New York and Boston, and ask them to fight venereal disease by co-operating with the Police Department. But we met that by explaining that we were doing exactly what everyone understands when a sanitary engineer is employed and sent out to the swamps in order to fight malaria. We found by this method that we as officers of the Army had the greatest advantage in educating the community to see there was no conflict between morals and medicine; that exactly what they wanted to do to safeguard the standards of morality was what we wanted to do to safeguard the men from infection from venereal disease. There is one reason why the Police Department cannot handle this question as raised here; it does not know what to do with these women. But we found in America when we sent those medical officers out, the police, judge or mayor of the city said "What are we going to do? We cannot bring them into court. If we fine them it does not do you any good, and lays us open to iniquitous administration." We had to answer that question. We got from the President as an emergency grant 250,000 dollars to try the plan of sending the women to State Reformatories, putting up little houses, much as our rest camps, to send these women to for indeterminate sentences. Most of them were infected and needed treatment for their own sake and for the sake of society. I have been much encouraged by the result of our work with these women and their rehabilitation. We were so convinced that this was worth while that we went back to Congress, and Congress gave a special Board we have called the Inter-departmental Social Hygiene Board, which has four million dollars, one million of which is for the care of these women who are taken up. That is given in small sums to the various States to start a nucleus. It was not that the money counted so much as that the United States had a plan, and was so convinced of its success that it put money in it, and aided the local committees. I am not quite in agreement with my colleague in the statement that we should put up slot machines for prophylaxis. It is because I do not believe that it will work that way. It is purely the administrative machinery. The theory is all right, but

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practically it has not worked in the Army. We have not made the prophylactic packet a part of our official programme in the United States, the reason being that Colonel Young over here had a better scheme, and we had a better one on that side and ordered the men to report to the early treatment station. Early treatment means doing something after the danger or exposure. The packet I do not think has much influence one way or the other. It does tend to give the man the opportunity to make his own diagnosis and then treat himself, and he does not do it thoroughly. In our programme of asking the civilian population to co-operate we have said to them: There is no difference in a man coming four days or two weeks after his exposure when he has the first evidence of actual infection, and his coming fifteen months after the exposure; but we want him to come to the station where he can get intelligent advice from the officer in charge of that station. If our dispensaries open their doors to the man who says "I have just exposed myself," we do not say that there is any moral or any other danger connected with them. There is this advantage to us, however, that here is a person who thinks he has exposed himself and we have him attending for advice. That is what we do in the Army, and we hope in the United States it will be used by the civilian community which has a status in this question which has been accepted, apparently by all authorities. We have made a great deal of use of the moving pictures in presenting this problem to the public, and we began by showing them to teach our men the story of venereal disease as a bacteriological problem. There was also an attempt on the part of the industrial people to get that film to show it to the factory employees. We have also presented this problem to the women, because we believe they have a large part to play in solving the problem; their views, their co-operation, their maintenance, administration and moral standards will enable them to play a part that most of our men cannot play. We have moving pictures which tell the same story to the women, and that is being carried out in the country at Conferences of our General Federation of Women, and of the Y.W.C.A. and other agencies of that description. I hope I have been able to give you an idea of what we have tried to do. The isolation of women convicted of solicitation depends upon State laws. We have not found a very effectual way in fines, and most of these woman are taken up and are being sent to these institutions

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for indeterminate sentences. So far as possible we have tried to bring both men and women before the authorities, though we should not take up any man whom we found soliciting because most of our laws do not permit of it. But where houses in the zones are raided, the men are taken to court as the women are, and we can and do examine them all as suspected carriers of disease, and where possible the men are dealt with. Our laws are different for the most part, and the men are not dealt with in the same way as the women as yet.

Sir ARTHUR NEWSHOLME, K.C.B., M.D. (Medical Officer, Local Government Board): Would you allow me to ask a question? Colonel Hugh Young made the statement that as soon as the particular brothels in St. Lazarre were closed the amount of venereal disease among the American troops declined to one-eighth of the previous amount. Presumably, those troops had been using the prophylactic measures which he advocates in the early part of their experience; but with such lack of success that the amount of venereal disease was reduced one-eighth when these brothels were closed. How does he explain the inconsistency?

Colonel HUGH H. YOUNG: The inconsistency is not an inconsistency. The fact of the matter is that they had had so much sexual intercourse—there was simply less sexual intercourse indulged in.

Rev. J. O. H. CARTER: I saw a statement in our Chairman's letter on the moral aspects of prophylactic propaganda, directed to informing the public that sexual indulgence can be rendered safe, which is not even true. He goes on to say, "We have no wish to comment." May I ask why?

The CHAIRMAN: Certainly, because we do not consider it is our business to undertake the moral education of the population. We leave that to the clergy. We always lay stress on the security to be derived from continence. We could not possibly undertake a whole moral propaganda.

Rev. J. O. H. CARTER: That I can quite understand; but why should letters on the moral side of the subject be kept out of the Press? I have tried in a humble way to get letters into various papers. They are not admitted. Apparently the living voice of the Church is dead, and the Nonconformist conscience does not exist. I maintain that in the victory stakes there are only two horses running—Syphilis and Civilization. I believe it to be an undoubted fact that syphilis is the child of civilization. I am

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told so by those who have studied the matter. Why not give poor old Morality a chance to run, too? At present all this matter is made public and spoken about—I will not say at every tea-table, but certainly in every mess. Our soldiers, quite rightly, are instructed on the subject, and I think they cannot be given too much instruction. But on the purely moral side nothing is said by the National Council or the eleven doctors who wrote such an admirable letter. Supposing there is an epidemic of burglary and you say to a thief: "Look here, my boy, here is a revolver; here is a jemmy, put it in your pocket," and so on, do you think it is going to stop burglary? I do not. I think you have to tell the intemperate that he is a drunkard, and the man of desire that he is doing wrong; and until you tell him that he is a plague both to himself and the community you are losing one of the great forces that will help to stop this disease. I am in favour of prevention and of cure, so that I agree with both the gentlemen who have spoken; but I cannot see why the moral side should not have some stress laid upon it.

Lieutenant-General Sir FRANCIS LLOYD, G.C.V.O., K.C.B., D.S.O.: I have not come here in the least prepared to speak. I can only put my views individually as commanding the London District for the last five years. I know the great difficulties there are in dealing with this problem, and I do think we ought to deal with it from every possible point of view. I think the lecturer put it as clearly as possible. First of all, I deny that the moral side is entirely left out. Lectures are given telling the soldier how he must avoid sexual intercourse if possible; how it is much better to keep away; how there is no harm in his keeping away, and how in giving way to it it does not make him more manly. But so long as you have men in this country, do what you will those young men will go into it. I do not care what anybody says, all the teaching in the world in this generation will not keep the young men away. The clergy have failed absolutely. The present laymen, do what they will, cannot stop it entirely, and therefore we want to use every possible means we can; teach, teach, teach. If prophylaxis is a real panacea, by all means use it, before or after. That is the question. Then as to London or other big cities. It is an impossible problem, almost, to take the women up. We have no power to do it; the police have no power, and they will not do it because they run into difficulties. As you know 40D regulation

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was no use. Therefore, what are you going to do? I do not think clearing the music halls was much use; you only drive them into the streets. But I say a simple act would be useful, namely, if the police were ordered to pass the women and the men on. You cannot stop them talking in the streets, but you will drive them from pillar to post and stop a great deal. It is a simple method which has always appealed to me. Use every possible means, use the moral; the moral will fail, therefore you must use the physical. If prophylaxis is good, and I believe it to be, use it before, use it after.

Colonel Sir JAMES BARRETT, K.B.E., C.B., C.M.G.: I have just terminated some years' experience in this connection in Egypt, and in general I agree entirely with everything Colonel Adami, Colonel Young and Colonel Snow have said. But this is the lesson we learnt. After all the moral forces that could be brought to bear, all the social influence that the vision of some of the most wonderful social scholars on the globe could effect had been brought to bear; all the preaching by chaplains, by doctors, by generals; all the directions which I took personally from the general officer commanding to the officers and men—in short, after everything was done, we partially failed. It was not till prophylaxis was added to the battery that we had any chance of getting to an end of the difficulty as we ought to have done. I speak as one who has tried, as anyone will see if they will be good enough to look through the statement of what we did to provide socially and morally for the wants of the men. As regards prophylaxis itself, whether applied before or after by the methods described, or used at the ablution tent afterwards, in my experience, it is almost uniformly successful, and the failures were not extensive. I can give you possible figures owing to the remarkable document by Colonel Elwood in which he relates his four years' experience in attempting to manage Port Said and keep the troops clean. He tried every means—social, preventive; he used his police and his scouts, but was partially beaten. He adopted prophylaxis with the definite result that of 9,000 men who passed through camp 4,500 reported exposure which represents, we know for certain, that between one-third and one-half of those troops had had intercourse with women in Port Said, some multiple, and out of these seventeen were infectious. You can thus form a pretty fair estimate of the value of this method when used in a wholesale way. During this year a very serious epidemic of typhoid broke out in

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Port Said, and the men reporting at the tents then became aware that they might be marked down as having broken bounds, so that after having exposed themselves they did not report and the venereal rate instantly rose. One other document should be produced; it is an official document, namely, the Report of the Cairo Purification Committee, which had on it such laymen as the Bishop in Jerusalem. The report was prepared in 1916 and shows the incidence of venereal disease in the troops in Egypt to be at the rate of 25 per cent. per annum for one month only. It was that extraordinary percentage that caused the steps to be taken in the form of prophylaxis after the act. I only desire to record my opinion that if this scourge is to be removed from the face of the globe—and I see no difficulty in that; in fact, I see no difficulty in its complete extirpation—it will only be done on the lines of prophylaxis. I am equally clear that any man or woman who tackles the problem cannot afford to throw away any agency which might help. You need every force brought to bear and to influence people in the right direction. In conclusion, may I refer to something which is the root cause of the whole business. When the average age of men becomes 30, and on the part of women becomes 27, and you have to deal with an almost uncontrollable impulse on the part of vigorous men, do you think that any force on the face of this earth is going to permanently prevent illicit relationship on the part of some men prior to marriage? You cannot prevent it. Our own Australian soldiers tell me to my face: "We do not care what all the generals, chaplains and doctors tell us; we have indulged in this way during adult life, and we are going on, but we are obliged to you for telling us how to avoid infection." You have people with this inclination, and women running after them prepared to cater for them. While those two factors exist it will want more powerful forces than we know of to-day and some radical reconstruction of our society before we can solve the problem. Every agency you can possibly use in every direction helps you somewhat, but in my personal experience nothing produces anything like the result of properly applied prophylaxis.

(*To be continued.*)

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THE ROYAL INSTITUTE OF PUBLIC HEALTH.

CONFERENCE IN LONDON, 1919.

Wednesday, June 25, to Saturday, June 28.

PRELIMINARY NOTICE.

THE war has prevented the usual Annual Congresses of the Institute being held during the past four years.

The last Congress was held in the University of Edinburgh from July 15 to July 20, 1914, at which an invitation was accepted to hold the Congress in 1915 in the City of Brussels; but, consequent on the war, this meeting was necessarily abandoned. It is hoped, however, that it will be possible to meet in Brussels in the near future.

The Council have, however, decided that the Annual Meetings shall be resumed this year, for it is felt that an opportunity should be afforded for the consideration and discussion of some of the more important problems relating to the health of the nation which are now occupying public attention.

The Council have, therefore, decided that a Conference of the Fellows and Members of The Royal Institute of Public Health, together with representatives of the various interested public authorities, shall be held in London on the dates above mentioned.

The opening meeting of the Conference will be held in the Mansion House, at which the Right Hon. the Lord Mayor will preside, and it is confidently expected that a representative gathering of well-known leaders of thought and action in matters relating to public health will be present.

It is proposed to arrange Conferences on the following:—

(*a*) The work of the Ministry of Health.
(*b*) The Prevention and Arrest of Venereal Disease.
(*c*) Housing.
(*d*) Tuberculosis.
(*e*) Maternity and Child Welfare.
(*f*) The Administration of the Poor Law.

It is suggested that those desirous of attending the meetings should make early arrangements for accommodation, as it is probable that visitors to London will be very numerous in June.

E. W. HOPE, M.D.,
T. N. KELYNACK, M.D.,
Hon. Secretaries.

February 27, 1919.

OBITUARY.

PROFESSOR RAPHAEL A. BLANCHARD, M.D.

It is with much regret that we record the death, at the age of 62, of Professor Blanchard, who was an Honorary Fellow of this Institute for many years past. He founded the French Colonial Institute of Medicine and was Professor of Parasitology to the Faculty of Medicine at the University of Paris. For twenty years he held the position of General Secretary of the Zoological Society of France. Professor Blanchard will remain renowned for his works on zoology, physiology and comparative anatomy; and his researches on parasites and parasitic diseases have a world-wide reputation. His death removes one of our foremost medical zoologists.

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THE OBVIATION OF SHIP-BORNE INFECTIONS.

BY

W. M. WILLOUGHBY, M.D., D.P.H.

Medical Officer of Health, Port of London Sanitary Authority.

A Lecture delivered at The Royal Institute of Public Health.

"CONTAGION is the inseparable symptom of the plague; which by mutual respiration is transferred from the infected persons to the lungs and stomach of those who approach them. . . . Yet the fellow-citizens of Procopius were satisfied, by some short and partial experience, that the infection could not be gained by closest conversation. . . . but the fatal security, like the predestination of the Turks, must have aided the progress of the contagion and those salutary precautions to which Europe is indebted for safety were unknown to the government of Justinian. No restraints were imposed on the free and frequent intercourse of the Roman provinces; from Persia to France the nations were mingled and infected by wars and emigrations . . . and the pestilential odour which lurks for years in a bale of cotton was imported by the abuse of trade into the most distant regions . . . it always spread from the sea coast to the inland country . . . the places which had escaped the fury of its first passage were alone exposed to the contagion of the ensuing year . . . The wind might diffuse that subtle venom but unless the atmosphere be previously disposed to its reception the plague would soon expire in the cold or temperate climates of the earth."

These words are all found on one page of Gibbon's history; in them are found the testimony to plague as a ship-borne infection, the direct infectiousness of the pneumonic form, the comparative benignity of the so-called bubonic and septicæmic forms, the influence of wars and emigrations on dispersal of the infection at a time not incomparable with the present and immediate future, and a recognition of the tendency to self limitation of plague. I am not conversant with the "salutary precautions" to which Europe was indebted for safety in Gibbon's time. In the light of present-day accurate knowledge of plague it would appear that his remark that the atmosphere must be previously disposed to the reception of plague, is more to the point. It is not until the concerted work of the Indian Plague Commission from 1905

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onward showed us the association of rodent, flea and man as the one outstanding feature of plague spread (at least in the inception of every epidemic), that salutary precautions can have been effective. The visitations of the past show clearly that the indisposition of England's atmosphere cannot be relied on. On the other hand the absence of epidemic plague through generations shows the potency of this indisposition as a factor and as the main factor in our immunity. I remember a ship arriving in England with two cases of plague on board; the cases were removed at the first port of call, the work of disinfection remained for the Port of London Sanitary Authority. Every textile article from all the living quarters on board this large passenger ship was removed for steam disinfection and returned to the ship in a creditably short time, all the living quarters were disinfected, and the ship proceeded to dock with her probably plague-infected rat population in the main untouched. Whether any infection extended to the rat population ashore is not known, nobody knew, nobody cared, why should they? The significance of a dead rat in connection with human plague was not generally recognized. Whether the atmosphere may have been indisposed to the reception of plague or not, the procedure adopted would now be considered the straining out of the gnat and the swallowing of the camel. Sanitary measures which do not take the flea and rat primarily into account are not complete.

In its day, quarantine of the ship must have been an insurance for a reason quite unsuspected at the time of its enforcement. There is no poison more efficacious among rats than plague; practically the whole of the rats on a ship, many or few in number, must occasionally be wiped out of existence by infection on the voyage, before the ship arrives at the wharfside. The extension of the possible time for this occurrence by quarantine must therefore have acted as a safeguard against the introduction of infected rats. My use of the word obviation is in recognition of the fact that prevention—a wider and more noble theme—is not the work of Port Sanitary Authorities; these lock the stable door after the loss of at least one pony. Obviation must have its backing for success and in the matter of plague I should like to draw your attention to the nature of this backing at the present day. Whereas our immediate ancestors smelt a rat, opened the floor boards and found it; the present generation on the whole is quite unfamiliar with even the general character of the beast, is remote from it—

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never sees it alive or dead. Since the trapping of drains became general in our communities the town dweller has been separated from the rat, and with the breaking of this former association I venture to say that sweeping epidemics of plague (the black death) in England are now an impossibility. Our atmosphere is the further indisposed to the reception of plague by a far-reaching, though in this blind, act of sanitation. I am far from implying immunity for England or that a rat plague infection at dock or wharf could be known to exist without anxiety and concern to the responsible authorities. These dock infections will occur from time to time, at points where an Eastern trade exists. The chief things to be remembered in obviation of them are as follows: (1) Every storage place for food should be made rat-proof and preserved in this state. Rats only affect places where food is of ready access, and ratty premises are dilapidated premises. Some years ago a rat ill and wobbling from weakness was sitting before a hole in a concrete floor waiting to get down. The hole was blocked by a dead rat, one which had been caught by the hind-quarters in its dying struggle to squeeze through—rats instinctively make holes which are externally just too small for them to enter freely. The sick rat on being kicked against the cellar wall gathered itself together and dived down an untrapped drain which was devoid of a grid even. The concrete floor was holed in many places throughout its length over the drain—a typical instance of dilapidation and the ratty state. (2) Rubbish and rejected foodstuffs should be removed regularly and rapidly from the places of temporary deposit. As is a common experience, I found that one of the first practical difficulties met with on setting up a fowl run under the stress of war-time egg prices at a certain hospital was the presence of a rat in the grounds, the inevitable sequence of the exposure of food. This effect is produced on a large scale wherever rubbish piles containing food waste are left untended. Long storage of food material also is not only attractive but affords convenient nesting, especially for black rats, with consequent local increase. (3) Cats, traps and poisons with systematic use will very materially reduce the number of rats in any district; in a rat-proofed district the danger of plague can be reduced to practically nothing. The inevitable residuum of rats is separated into small non-continuous colonies, and one of these becoming infected may be wiped out completely by plague without

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spread of the infection. I think I have observed this phenomenon on more than one occasion. I consider that the atmosphere of the London docks is being rendered somewhat indisposed to the reception of plague by means of the aromatic baits best known to the rat-catchers. The Port of London Authority by continuous effort is coping with the danger and damage arising from rats; in this matter the leeway of past years of neglect is being made up. All recognized methods of extermination are good; as with the submarine, so with the pestilence that walks in subterranean darkness, no method of destruction is worth consideration apart from constancy in its use. Rat catching is uphill work in dock premises which are constantly repopulated from without; in addition to escapes from ships, docks and wharves are liable to the strays of annual migrations or migrations under special stress, and a rat which has found its way in remembers the way out and teaches this to its brood—a dangerous factor.

I am not aware of any systematic action which may be in operation in the districts surrounding ports. The recent Rat Order of the Ministry of Food has followed the correct line in recognizing that rattiness of premises is the responsibility, monetary and otherwise, of the owner of the premises, and although ragwort still cheers the eye in our summer fields despite another order, this flower has been temporarily immunized under the stress of war, and it is not too much to hope that under the same stress the atmosphere of England may be rendered yet more unreceptive for plague through the Rat Order. I have dwelt on the atmospheric disposition to reception because of its great bearing on the success of the inner guard work which Port Sanitary Authorities perform.

Turning to work of obviation on shipboard, there are certain internationally concerted lines of action.

In the case of plague-infected ships these are :—

(1) The medical inspection of crew and passengers.

(2) Disembarkation and isolation of the sick and suspected cases.

(3) The disinfection of infected articles and infected quarters.

(4) The destruction of the rats on board either before or after discharge of cargo; and

(5) The observation or surveillance of contacts.

These are principles: the effective working of the mass of detail underlying them is best inquired into from actual experience.

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The first difficulty in the practice arises as to suspected cases. Who shall constitute suspected cases? Every man who presents a bubo obviously, but these are not the difficult cases in which to separate plague from others not plague; the cases not plague have usually a well-defined cause for the bubo, though recently a small seaman of 14 years of age and 25s. a week salary presented himself with a bubo in the groin and a quite possible cause for the bubo in the iliac region in the shape of an angry pimple of some dimensions; the bubo, however, was the accompaniment of a smart attack of plague; yet another youth occupying the same cabin with the boy and presenting fever was not suffering from plague. The difficult cases are those of simple fever without any other symptom or sign than a malaise—may be as slight as is to be expected with a "cold." One such—an old man and native of India who for four days looked well, and expressed himself as being well—was only diagnosed on his sudden demise; post-mortem, any drop of his blood from any organ showed the characteristic bacillus of plague on staining.

Thus in an infected or suspected ship or on a ship on which mortality among rats has been observed, every case of fever is a plague suspect until the cause of the fever be found, or declares itself. This is no inconsiderable burden on a Port Sanitary Authority considering the multiple causes of obscure fevers derived from Eastern ports. Here I would draw attention to a risk that must be taken, but can be minimized. On a ship which has had recognized plague amongst the complement or recognized mortality amongst rodents before arrival, the course of action is clear. But ships from rat plague-infected ports may have rat plague on board below hatches quite unknown to the responsible officer who answers the questions put on arrival until the hatches are lifted or cargo discharged; by which time passengers are dispersed, the crew paid off, and infected rats possibly disputing and sharing possession of the nearest food store with their naturalized confrères ashore. A mild case of plague on such a ship which would have been immediately suspect in the presence of a known or declared mortality among rats might easily pass muster, but this and a greater general danger might be minimized if declaration by the responsible officer of the ship were made obligatory whenever such a mortality comes into view. I suggest that such rat infections on ships from time to time exist unknown at first and disregarded later in the absence of the human case as indicator.

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In connection with the landing of patients, a minimum only of bedding is taken to hospital with each case to avoid transfer of infected fleas. Otherwise nothing is taken from the infected quarters or handled until after a preliminary fumigation of twelve hours by sulphur burned in proper proportion. All crew's quarters and their contents are simultaneously put under this preliminary fumigation to render them free of possibly infected fleas or rats, and to rid them of those fleas, which, though uninfected, might become so in the presence of a future case at present incubating the disease. Living quarters on the ship are thus rendered reasonably though temporarily secure for habitation by the crew during subsequent procedure, and infected effects safe for handling.

The crew is taken ashore and bathed; whilst bathing their clothes are passed through the steam disinfector. Meanwhile an examination into the circumstances of the outbreak will indicate a focus or foci of infection on the ship, and also that part of the complement likely to supply the future cases of plague. A consideration of five successive infected ships shows that: (*a*) In the first the only case was that of the man whose duty it was to get up food stores for the native crew. The native food store was situated in the No. 1 hold, was open to rat access, and there was a heavy and known, but disregarded, rat mortality in the hold, precedent to the case and disclosed on unloading. (*b*) In the second, the first case of several was a white steward who issued food stores to the native crew; his duties took him down into the fore peak, situated ahead of the collision bulkhead, from which dead rats had been removed. All the cases occurred in the neighbourhood of this food store, which opened into the forecastle quarters. (*c*) In the third all the cases occurred in the forecastle except one, and chiefly on the starboard side; the native food store and galleys were situated on the same side, the former opening by a trap into the forecastle. The one case living in amidships quarters lived below decks, but came forward freely to the galley. Many dead rats were turned out of the forecastle. The holds were infected throughout the ship. (*d*) In the fourth ship an amidships general food store open to rats of No. 4 hold was the line of communication between the dead rats and the crew. This food store was approached from the port alley-way by a door immediately opposite the engineers' quarters. The first men down with plague were the storekeeper (as usual) and an attendant who threw out the dead rats, the third a native lavatory attendant.

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The lavatory and bathrooms, the nearest place for the rats to obtain water, opened into the port alleyway close to the engineers' quarters and the storeroom door. A fourth case was in an engineer whose door was opposite the food store. The cases lived in various parts of the ship, their infection was referable to the food store and its neighbourhood. (*e*) In the fifth ship the food store was in the poop, a smell of dead rat and clearance of the cause from the food store preceded the human outbreak. The first four cases, monotonously enough, included the steward who issued the food and the three men whose quarters were in the poop, the quarters being improvised under war stress. One other case arose in a boy who berthed with the affected steward; another boy who berthed in the same cabin had fever, at first unaccountable; he was, of course, taken off as a suspect, and proved a puzzling case, but was not a case of plague. The fifth case may, therefore, be a contact case from the steward through the human flea, but nowadays the poop with its gunners is an attractive place to boys when off duty; and when on duty this boy assisted the sick steward. He was a constant visitor to the poop. Where the cockroach swarms, the crew is apt to tolerate the human flea; yet the experiences related suggest that contact with the dead rat's fleas is more likely to afford the case of plague than the contact with the human case of bubonic or septicæmic form. Our nurses are close contacts perforce, but it is explained to them that the danger in nursing bubonic plague under flea-free conditions is less than that in enteric fever cases; let them conduct an energetic flea hunt when the cases are brought in.

Gibbon was strong on the point of breathing in of the infection, and rightly, for the pneumonic case is deadly in this mode of infection; as an inspired recorder he notes also the opinion of other observers who stayed among plague that the disease was not infectious. We may now picture these observers as being cultured friends of Procopius, and nursing bubonic forms in flealess, ratless surroundings. It is interesting that amongst our series of cases there occurred one of an extensive dry pleurisy over the whole of the front of the chest and down the right side; a tenderness, then a swollen gland in the left femoral region only appeared after four or five days of severe illness—a pulmonary case without a cough or sign of pneumonia. Another case had pneumonia of the broncho-pneumonic type, with a rich flora in the sputum, in which my colleague, Dr. Betenson, and I saw bacilli of typical bipolar appear-

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ance. The desperate nature of this case promised to afford ample material for post-mortem diagnosis: so we let slip our first opportunity of diagnosis, and our second, happily, did not mature. The case struggled through collapses to recovery, but remains undiagnosed. I look upon it as a case of plague where the plague septicæmia affected the lung only after a large degree of immunity had been established.

Meanwhile we have left our ship in the following state. The infection on board is now all under hatches, the fleas and rats are for the time fumigated out of all living quarters on board, and the ship is moored in midstream so securely that we can pay off all but a skeleton crew. We should berth this remaining crew as far as possible from the foci of rat infection—namely, food stores, in anticipation that the rat infection is still running its course in the holds, and knowing that quarters near those already fumigated foci are liable to reinfection out of the hold. This liability is known from watching fumigation of holds; if there are not actual rat runs from hold through these quarters to the food store, the quarters near the food store at least form handy hiding places, but in old ships rat runs *are* made through the quarters from the hold to the stores.

The rat infection has now to be dealt with. I believe fumigation of holds without discharge of cargo, if judged to be desirable, is not to be effected with that degree of certainty which the circumstances require. Sulphur dioxide is not the gas to be used, in effective percentage over effective periods damage accrues; while a carbon dioxide and monoxide mixture (flue gas) is probably not effective against rat-fleas and is dangerous, and hydrocyanic acid gas cannot be brought to the recesses because of its physical behaviour—to say nothing of its lethal properties which are so good in their place and so deplorable when unmanageable. In England inquests are held, and sympathy is with the slain.

The question of discharge of the cargo raises many difficulties. First, the question of prophylaxis amongst workers. I have decided not to offer the preventive inoculation. The decision was not made on medical grounds at all. A risk was taken, but in five successive infected ships I have not known any evil result. Ship-workers all know that the ship is plague infected; I presume that this is a safeguard to the general public more potent than the notification of each worker to the medical officer of health of his district, which is

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also made, because any worker taken ill would probably mention his particular circumstances of work to his medical attendant, and put him on his guard as to diagnosis. Every worker is dressed in a one-garment overall, tied in at the ankles and wrists against the possible attacks of fleas, and, on leaving work, this garment is left on the ship. Over ninety dead rats were found in one hold of one ship during discharge. Most of the rats were very dead, but recent loosing of many infected fleas must make the hold a dangerous spot. How dangerous can only be a matter of inference from the state of the dead rats; if many recently dead are discovered, the chances of meeting hungry and unpurged fleas in the holds are enlarged. Other things being equal, an average ship-worker does not, of course, hurry when working on good money *more* than he does when on bad. To him plague infection is equal. To one who is eager to see the ship filled with sulphur dioxide, and to know that every rat and flea on board has received a lasting quietus, discharge under present labour conditions is anxiously slow; it involves the exposure to infection of an unnecessary number of people over an unnecessary time.

The discharge of cargo is effected under the following control: Cases and barrelled goods incapable of harbouring rats or nests to proceed to destination without hindrance. Bagged and baled goods to be stored in barges or in sheds allocated for a minimum period of fourteen days. All bales or bags capable of harbouring rats or nests to be scrutinized before delivery overside, and broken cases examined and recoopered on the ship. Lighters not to be allowed alongside during the night or after working hours.

An inspector on board the ship to guide and watch the procedure of discharge should be able to be certain that no live rat is put overboard with cargo. The ship workers must be shown how to take an intelligent interest in the matter. The ship being empty of cargo is filled from stem to stern in every closed space with sulphur dioxide gas. All spaces which are capable of harbouring rats are simultaneously full of the gas; there is no opportunity for the retreat of the animal from one part to another. All exits for gas being closed, there is no exit to deck for the rat. This fumigation of a ship is a skilled operation, and for performance is under the direction of those who have studied the ship and her intricate structure from stem to stern. The decks should be free of lumber, and covered steam pipes and other hiding

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places thereon should be searched; the boats can be filled with water, so that they afford no resting place for rats.

At the end of from twelve to twenty-four hours, preferably the longer period, the hatches and living spaces may be unsealed. The action of 3 per cent. gaseous admixture is rapid; in the case of rats, a few minutes' exposure, and for insects, but not of their eggs, two to three hours are absolute.

Of course the bilges are free of standing water during fumigation, or the gas will soon be absorbed. In the preparation for the process of fumigation, this point, and the reasonably gas-tight sealing of all possible vents, is seen to.

The gaseous mixture by its physical property sinks as soon as cool, and though the third action, diffusion, is rapid and complete in a space within a few hours, the second action, sinking *en masse*, is important, as it enables that a ship be filled up until brimming over. This effect can be produced with great certainty by the instrument of precision used in the Port of London.

A raised forecastle or other small space is conveniently dealt with by sulphur candle: one pound, at least, of sulphur being burned for every 1,000 cubic feet of space.

I believe the quantity and percentage mentioned, if exposed over twenty-four hours, may leave a margin of at least 500 per cent. for security in the object sought, but the margin is necessary to meet all conditions. On the careful watching of small detail, the success of the long, and therefore expensive, process I have described can alone be assured. There is an important point which has to be recognized in the scientific side of our dealing with plague ships and plague in general. However useful, interesting, and soul-gratifying in the completeness of its demonstrations bacteriology may be, and is, practice must be a day, perhaps many days, in advance of the bacteriological certainty. Clinical evidences are of necessity the guide to action. The plague bacillus, though not a very strict parasite, is sufficiently so to suggest that if clinical evidences are only met by a bacteriological negative, the difficulty and consequent failure are on the bacteriological side. The putrefying rat, and pus or fluid from the bubo of a self-immunized patient, are not material from which the plague bacillus can be readily obtained for demonstration, though this may have recently swarmed in that which is submitted to the bacteriologist as being at the moment of decisive action the only available material.

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The ship may now proceed to dock. How close the subsequent search for dead rats should be on board, is mainly a matter of æsthetics and records. The bearers of the bacillus, the rats, and distributing agents, the fleas, are dead, and the bacillus does not long survive them.

One other very important measure remains to be described, that of the notification of addresses of contacts. Every person on the infected ship must be considered a contact of the infected flea in the inevitable absence of proof to the contrary. Therefore no person should be allowed to leave the ship without satisfying the medical officer that he or she is going to the address which has previously, often perfunctorily, been given to the purser or steward. It has been the practice in the Port of London to obtain a list of names and addresses of crew and passengers on every ship immediately on arrival if coming from a port where rat infection is known to exist. This list serves the double purpose of a basis of more exact information if the ship is definitely infected, and some aid in tracing people when, on discharge, the ship may be found to have rat infection hitherto unknown.

The addresses on a perfunctory list comprise banks, hotels, and foreign addresses obviously not of much use to the purpose. Every passenger on an infected ship is seen individually, and is questioned as to the permanence of the address given as residence over the ensuing days of the incubation period. There is much room for error; passengers vary from the unblushing or the mischievous prevaricator to the honest person who returns from the landing tender alongside to change the wrong address which has been given in all good faith. Cards of instruction are given to those in doubt, and, on the whole, the principle of "If you cannot be efficient, be as efficient as you can," is believed to nearly produce the required accuracy in the address list. From the much desired communications I have from time to time received from medical officers of health, to whose districts addresses have been forwarded, I appreciate both the weakness and strength of this system of notification. From what I have previously said as to infection foci, the danger is not liable to exist amongst either first or second-class passengers, and I have not always deemed it necessary to alarm passengers by telling them of the illness on the ship in the case of plague or other disease. Such are the methods, and such the details in execution of them which have commended themselves to me from a study of

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plague and conditions met with on infected ships. The variation in conditions is considerable; one ship may have a large number of passengers and a cargo attractive to rats, another a small white crew and a cargo so unattractive that practically all the infection is above the main deck; the conditions have to be carefully sought out, and the most urgent danger to human life removed first, then the remaining infection.

Plague is the only ship-borne infection that needs a programme with so long a delay to the ship. By international agreement cholera-infected ship are to be dealt with in precisely the same way as regards principles; in place of extermination of the rat, however, the water tanks and whole system of water supply of the ship will need cleansing if the infection on board be derived from the water, or even if the water supply come under suspicion.

The suspected case and the contact will present the same difficulty as in plague, though in these material, for bacteriological examination will be more easily obtained. A doubt will only arise as to how far a bacteriological negative is acceptable in the case of suspects. In illustration of the remarks of Gibbons as to the pestilential odour which lurks for years in a bale of cotton, I have here a photograph of a bale of wool of which the outside has been squirted with carbolic acid—I hope and think not very strong—on a cholera-infected ship. This is a relic of the good old days. There is, of course, not the faintest reason for interfering with the cargo on a cholera-infected ship, apart from material suspected of body contamination. But this knowledge is more recent than that of photography.

Is cholera a real danger in England? I venture to think not—at least in the sense that it would take the form of the large epidemics of the past. The people in England who still live "under the curse of Rabshakeh," as Kingsley would put it, are comparatively few, and they alone are exposed to ravaging cholera infection. The atmosphere of England, on the whole, is not disposed for the reception of cholera. The masterly description of the course and causes of cholera in Hamburg and Altona down to the great epidemic in 1892-3 by Dr. Reincke should in the main have laid the cholera bogey in England, unless the machinery of control become dislocated in a way that is beyond warrant of present expectation. This comfortable opinion, however, would not be allowed to interfere with the rigid treatment of a cholera-

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infected ship indicated by present-day knowledge. The sick and suspected would be removed to hospital, the contacts notified on to their destination and infection carefully sought out and destroyed in bedding, effects, quarters, and water system.

Small-pox is not a matter of international any more than national agreement, but would be met in the Thames with quite as much concern as cholera or plague, and on the same principles of obviation with details suitable to the disease.

The long incubation and course, the mode of infection, the mildness of some of the cases and the ease with which misdiagnoses are made by the unwary, make this disease formidable in the presence of an atmosphere disposed to its reception, i.e., an unvaccinated population, or a population which has to some extent outworn the immunity resulting from infant vaccination.

In ports chicken-pox should be constantly notifiable.

Every person on the infected ship would be offered vaccination. If possible, before that offer is made, every one of the crew should have the privilege of seeing the unfortunate patient on removal—not too closely—for the purpose of encouraging the sea lawyer in their midst, and disposing him to the slight operation. The surgeon should then vaccinate himself in the presence of the muster; if further encouragement be needed, the persuasive eloquence of the surgeon and a discourse or argument may prevail. I have proved the efficacy of any and all of these methods, and mention them as practical details leading to successful efforts. Time after time I have found the whole crew respond to the invitation—when properly put.

The work of the London County Council and other medical officers in the recent outbreak in the East End was marvellous in its results in stamping out the outbreak. Every one who watched their effort with knowledge could see how near they were to being outdistanced by the epidemic so well fought. The liability to such outbreaks is constant. On a continental boat, on one occasion, I asked a lady to take off her gloves and raise her veil. The pips of small-pox were still in her palms and soles and the recent scars on her face; she knew she had been severely ill, she did not know she had had small-pox, and no disinfection of her effects had been made. Her fellow passengers were gone beyond recall; the boat was not, and would not have been boarded for quarantine purposes; it would have been the fault of nobody if the lady had escaped

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detection and disinfection. It was just one of those cases which suggests that security rests in a well-vaccinated and revaccinated population only. If vaccination at the time of performance be suspected to be useless as a present protection to the individual and those with whom he will associate ashore, the occasion should nevertheless be seized for every seaman, as removing for many years with each vaccination successfully performed one potential source of introduction of small-pox. Many merchant seamen, however, can now show a passport in the form of six or eight scars, as generally implying immunity.

In the presence of typhus fever all other measures after removal of the case should pale before those directed to securing a louse-free crew of liberty men. I have not yet dealt with a typhus-infected ship, but on the arrival of such, if a steamship, every textile article from infected quarters, preferably after exposure to a sulphur fumigation for safety in handling, could be put into a deck-house if one of sufficiently non-conducting structure were at hand or, failing this, into one or more tubs or barrels lightly covered, and steamed from the nearest pipe that could with convenience be branched until all albumen, louse or other, were coagulated. The clothing of the crew would be similarly treated. The crew would be required to bathe, and at least every contact provided with sufficient soft soap emulsion to lather himself from head to foot. The patient removed in a clean blanket would be kerosene washed on arrival in hospital.

The details would differ on each infected ship, but the aim would be to permit no louse, infected or otherwise, to reach the shore alive. The quarters with much iron in their construction would be more suitably exposed to sulphur dioxide than steam. Sulphur dioxide would also be an effective fumigant in the spread textiles if found more convenient than steaming.

The young or adult louse once detached from its host can be easily coagulated, or poisoned, or even starved to death; but the drowning process is the best open to us if, as is often its habit, the louse is clinging to the person. There are two agents which, either separate or mixed, drown the louse—an alkaline solution and an oil. The essential preliminary to wetting the insect's spiracles with water is saponification of the layer of fatty material provided on the cuticle of most insects by nature against such a catastrophe; for this a soap with plenty of free alkali is indicated; hence also

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the soapsuds for the rose blight. On the other hand, oil mixes with oil, and is a superior and immediate drowning agent. I have noticed with hibernating mosquitoes that in making permanent microscopic preparations it suffices to let the insect dry for a day or two, and then immerse it on a slide in a drop of half and half Canada balsam and turpentine; the air from between even the myriad scales is driven away in the intimate wetting which takes place. True, some of the scales are removed in the process, but the majority remain to form a striking exhibition of the principle of drowning in oil. Live earwigs in the water can bob up to the surface a dozen times, but only once if there is the faintest film of oil on the water; the drowning is then visibly instantaneous. Without further legal powers than those possessed at present, one must needs depend on the innate common-sense of the seaman-contact of typhus infection for his consent to make himself and his shore associates safe from spread of the contagion by drowning his insect visitors.

I have indicated the methods, general and particular, used in four diseases which seem to me now or prospectively to deserve the title of ship-borne. In general, with infectious diseases, special measures must be applied to each in order to avoid unnecessary work on the one hand, and to deal effectively on the other, but, above all, interested personal supervision of detail is needed. For efficiency, the necessary knowledge of the etiology and mode of spread is now abundant and accurate.

I would close this sketch with a plea for general education in the rudiments of those matters which are at once so simple and so interesting, and yet afford as ample mental gymnastics as much of the comparatively useless knowledge crammed to forgetfulness into the children of the present generation. These are matters which concern every man and woman individually; all should be turned early to the study of common things, so that those who wish to be clean, clean they will be. This, however, is prevention, and my subject has been merely obviation.

THE ROYAL INSTITUTE OF PUBLIC HEALTH.

The following have been elected:—

Fellows: Capt. Eric H. R. Harries, M.D., D.P.H., R.A.M.C.; Major Alick E. Knight, D.S.O., M.C., M.B., R.A.M.C.; Capt. Norman W. Rawlings, L.M.S.S.A., R.A.M.C.; Capt. George F. Weatherhead, M.D., C.A.M.C.; David J. Williamson, M.B.

Members: Victor G. Gibbs; Chandroth Sumukan.

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CONFERENCE ON THE PREVENTION AND ARREST OF VENEREAL DISEASE IN THE ARMY, AT THE ROYAL INSTITUTE OF PUBLIC HEALTH.[1]

Chairman: The Right Hon. Lord SYDENHAM of COMBE, G.C.M.G., G.C.I.E., G.B.E., F.R.S.

(*Continued from p.* 95.)

DR. C. W. SALEEBY: I should like to say that I consider it is a pity that these matters are dealt with in the Press without sufficient definition. I noticed in the *Star* that an ingenious sub-editor had done his best to look up what was meant when the *Times* man spoke of the use of calomel. The editor added a note that calomel is a drug which is taken in relation to syphilis in the form of a pill. It is an awful pity when these things are taken in that shamefaced half-way. We have had no allusion this afternoon to the importance of the amateur; and those arguments with regard to taking up the women lose a considerable portion of their cogency with those of us who have heard Colonel Harrison and seen those extremely carefully obtained figures of his which appear to show that in our venereal hospitals in this country at the present time as many as four-fifths of the infectious cases appear to be due to amateurs. Even when that is qualified, as it ought to be, by inquiries at Holloway and elsewhere, it shows how many amateurs, "receiving no money, nevertheless receive clothes"; so that in fact they are not really amateurs. Even so, the importance of the amateur should be remembered this afternoon. May I say there is some doubt whether the prevalence of venereal disease is the main factor for the fall of the birth-rate in this country during the War, as one of our distinguished American visitors has said. On the Birth-rate Commission that is not what we found. On the contrary, evidence seemed to show that until the outbreak of the War venereal disease was diminishing, and at the same time the birth-rate was rapidly falling. All the evidence appeared to show that that fall was primarily a matter of the use of contraception.

Fleet-Surgeon P. W. BASSETT-SMITH, C.B., R.N.: Perhaps I might say a word or two with regard to the steps that are being taken in the Navy. In the first place we recognized that there are in ships large numbers of extremely healthy young men who are

[1] The Conference was held in connection with the Venereal Diseases Department of the Institute, January 8, 1919.

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cooped up for indefinite periods and are given leave at certain times. When they go on shore they, as a rule, must have good times. You have that fact to recognize, and we did recognize it. The Medical Director General has arranged that in every ship health lectures shall be given by the medical officers of the ship to the men, drawing their attention to the facts that have been dealt with to-day. The second great point after the health lectures is the fact that opportunities are given for as much healthy recreation as possible, because if a body can work off its vigour sufficiently there is less chance of men seeking trouble elsewhere. Thirdly, that when the men go on shore they know that there is prophylactic material which they can use under more or less skilled assistance. So that it does come more or less as a voluntary business. It is not compulsory; they know it is there, and they can get it when they want it. But of course one has to recognize that when a man goes ashore—not so much during the War as before it—there was plenty of drink, and when he is in a state of drunkenness how can you expect him to use any prophylactic measures? During the last three or four years there has been a diminution of syphilis and gonorrhœa in the Service, which is encouraging.

Sir ARTHUR NEWSHOLME, K.C.B., M.D.: I have listened with interest to the lecture and to the American surgeons who have contributed to our knowledge of this subject and to the efficiency of the arrangements for the control of venereal disease. I consider the medical arrangements are the most complete which have yet been devised in the course of this World-War, and the American Medical Authorities are showing us an example which it is a great pity we did not adopt earlier. It is true they came later and therefore profited by our experience, but I must confess that notwithstanding all that has been said on behalf of the Canadian and American Forces and their experience in the War, I am somewhat imbued with a sense of despondency in view of the relatively ill-success they have achieved. Colonel Young said the one efficacious thing which happened was that those three brothels were closed, and immediately the amount of venereal disease was reduced to one-eighth of its former incidence. Before that they had been adopting all their known measures, and yet they were carrying a very considerable incidence of venereal disease. And when they adopted in regard to those brothels exactly the same methods as with their American troops, or, in other words, when they

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surrounded them with barbed wire they got less venereal disease. The great lesson which comes out of that undoubtedly is the fact that the one chief means of preventing venereal disease is the avoidance of promiscuous sexual intercourse, and no other means comes up to that in efficiency. I was very much struck with the figures Colonel Adami gave of the Canadian experience. They were for a couple of years. He cries scorn on all the British methods, and with a certain degree of reason, but I now retort with regard to the Canadian measures. At the end of two years' work, after doing everything they knew how to do, with prophylactic outfits *ad lib.*, he has confessed that out of 110,000 men at one time 750 were in hospital with venereal disease—seven per thousand at one time, after two years' work on the subject on behalf of those apostles of efficiency from Canada. That is the result, and the only result, he is able to show. If I am wrong, perhaps he will correct me.

If under the conditions of military discipline, Colonel Adami and the Canadian Forces generally are only able to produce that result, what prospect is there under the free conditions of civilian life of a very rapid and immediate success? It is quite true that only 1 per cent. was able to be controlled, but he did not manage to control that 1 per cent. successfully. He used prophylaxis, but in a very large proportion of cases it failed. Probably the men were half drunk. This is the most common cause of failure. But still I must say the net result, hearing the military experience, has made me somewhat less optimistic than I have been in the past in regard to the effective control of these diseases. I was very much struck by a remark of Colonel Snow to this effect: that when a public health and moral measure come into conflict with each other, the public health measure will get left. That is a very important axiomatic remark, and I should like to extend it further and say that when a public health measure comes into conflict with a moral sentiment the public health measure gets left. The moral sentiment may deserve all the derision which Colonel Adami has thrown upon it, but it is there all the same. And if there is a moral sentiment against a given public health measure that public health measure will not be carried out, and if carried out will not be successful. That has a very important bearing on the question of the legalization of prophylactic outfits. They may be right, they may be on the borderline between right and wrong, but the

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public sentiment of the civil population would not stand them as official measures. That being so, they will get left. When Colonel Adami, therefore, speaks about persons who object to such outfits as being hypercritical or hypocritical, he will find he will get left in criticism of such arrangements.

Lieutenant-Colonel J. A. AMYOT, C.A.M.C.: My conviction is that all means must be taken into account. We try to warn the men, we give them preventive measures; we give them early treatment and we give them facilities of getting it at every possible turn, so that they will not have to walk ten miles for it, and do not have to pay to get it. We have been satisfied with the results, and conditions are very much better since we commenced to do that work. In dealing with the civil population, of course, you have another problem.

Miss Helen CHAMBERS, M.D.: I think there is a great lack in most of the speeches that have been made this afternoon, and that is that they do not give the women's point of view. This is certainly a question for both sides, and the reason, to my mind, that there has been such failure in the past is that the women have not been consulted. I do not think it is an omission which has been avoidable; there have been few medical women in the country, and women generally have been extremely ignorant on the subject. I think the time has come when women should no longer be ignorant, and medical women ought to teach them. It seems to me that men in the past have failed entirely because they have failed to control the women. In all these speeches the big difficulty has been not the control of the men but the control of the women in the civil population. There are a certain number of them whom even we women appreciate need control. That control, it seems to me, can only come properly from women. Men have brought in laws in the past like Regulation 40.D. They have created an enormous resentment in the public mind, and rightly too. They have tried to control women without the women's consent. I say that really what you want to do is to turn to this Suffrage Society who have pulled to pieces 40.D and to say to those women: Find some method by which you can control your own sex; bring forward legislative measures; let us have women police. One of our greatest scourges at the present time is the condition of our streets in London. There is not a woman existing who does not wish that the troops coming home shall not be faced with what they are faced with. We want some means of making our streets not

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places of temptation, but fairly clean. That can be done, I think, by women police. I think they should be there to keep continuous movement in the streets. Have a law against loitering, not a law which allows a policeman to arrest a woman on the slightest provocation, but a law that makes them move on, so that there is no need of loitering in the streets and no arresting of any woman. There is one other matter which seems to me a very great difficulty, and that is, what am I to do when an acute case of venereal disease comes to me for treatment? I have no hospital bed into which I can put her. She is given temporary treatment; she continues to be infectious for a week or three weeks, and yet I am allowed to send her home. I maintain that in acute infectious cases the right thing to do with that woman is to send her to a special department of an infectious hospital, not necessarily venereal; an infectious hospital, which simply means that she goes as suffering from an infectious disease, and there she could stay for three or four weeks until her most infectious period was over. Treat her as an infectious patient, not as a venereal case. That is done very largely for men. I quite appreciate the military point of view. I have been working for the Army for the last four years. They have complete control of the male population, but not of the women. That, I think, is quite unjustifiable, and I do not think any medical woman could hold that they should not have control. I think we ought to control infectious cases, either venereal or any other, and the only way to do that is to put them into hospital until they cease to be infectious.

Miss BALLANTYNE (New Zealand National Street Control): We have been able to form a corps to patrol the streets, and if we get a girl and know she is infectious, we do not know what to do with her. We have taken eighty-five girls off the streets of London, sixty-five of whom have made good. After we had taken off the eighty-five, the Y.W.C.A. said they had no more accommodation, and for the last four months we have not been able to take one girl off the streets. As we have worked these streets for the last nine months we have realized what the result will be in New Zealand, and we have come here to try and safeguard our men. Our corps consists of twenty-five, including women of British nationality, Americans, Australians and four New Zealanders. We feel we want to help these girls, because otherwise we cannot help our men; and if we can get a scheme through whereby we can aid these girls, we can have something done properly for them.

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We have tried, and we are quite ready to go on with it and assist the young womanhood of England. We are only too glad to have this opportunity of coming forward and helping the Empire.

Sir ARTHUR NEWSHOLME: If the two ladies who have just spoken will put themselves into communication with me at the Local Government Board they will find that arrangements are made for the particular cases to which they have referred, and if the accommodation is in any way deficient it can be made adequate for the purpose. I am quite certain that the London County Council and myself together would find places available for all the cases you speak of.

Professor WILLIAM R. SMITH, M.D., (Principal of The Institute): I am sure we should not like to separate without thanking Colonel Adami sincerely for the interesting and instructive address he has given us. We are also greatly indebted to our American friends for the material help they have contributed to this discussion, and to all who have helped to make things clearer our best thanks are due, not forgetting Lord Sydenham, who has so ably presided. I therefore propose on your behalf that our very cordial thanks be given to Colonel Adami, our American friends and all others who have assisted in this discussion.

The vote of thanks was carried by acclamation.

Colonel J. G. ADAMI, in returning thanks, said: There is very little I have to say save a word of appreciation of the high and serious tone of this discussion. I think we all feel that this is one of the biggest problems of the moment which has to be faced. I have to confess that feeling that I purposely went out of my way to stimulate feeling. I may say to the ladies present and to those who have spoken, that speaking for the Army I feel a certain natural modesty; but I believe with them heartily that more than half the whole of this movement can be accomplished by their aid. There is only one point remaining. Sir Arthur Newsholme made some ingenious remarks with regard to what I said we had done. Wishing to be frank I possibly misled you. I tried to state that we Canadians are no better than anyone else in the British Empire. We have had our troubles. If you read the reports from Montreal and Toronto you will see that conditions there are every whit as bad; only we are here united for the cause of Empire, and we ask the Old Country to help us and to take a full and serious view of the enormous seriousness of this problem. We have to work together, and I believe we are on the threshold of a very great advance.

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INDUSTRIAL HYGIENE IN RELATION TO WAR STRAIN AND TECHNICAL DEVELOPMENT.

BY
PROFESSOR I. WALKER HALL, M.D.
Professor of Pathology in The University of Bristol.

Abstract of a Lecture delivered at The Royal Institute of Public Health.

THE War has imposed considerable mental and physical strain upon our industrial population. The return to industry of men partially disabled by wounds, gassings, infections and shock, will make it more necessary to ensure a full compliance with hygienic regulations. The development of present research activities may lead to the formation of new industries associated with processes hitherto untried on a large scale. Such industries should be encouraged to promote simultaneous research into the action of new methods, or new substances upon human tissues, in order that preventive rules and apppliances may be devised.

To follow closely the various stages of these processes in relation to their dangers to the health of the worker, should be one of the chief duties of the works doctor. It may be found necessary to institute special training to this end. The evolution of the human factor under new conditions also demands the attention of the hygienist. The personal mentality of the worker is not always easy to compass. The truth is that our habits in hygiene are formed during childhood. School life may consolidate but does not add much to the home training. The provision of adequate houses may indirectly do much to promote the tendency to a more general facility in carrying out hygienic procedures. But more than this is required. Defective habits are not removed simply by transferring a family to cleaner surroundings. It is to a correct education of the young child in the social hygiene of natural secretions and excretions that attention should be directed. The whole fabric of industrial life hangs in reality upon the mothering and upbringing of our future working units.

To reach the inner life of the home in order to ensure the provision of hygienic workers is a problem beset with many difficulties; but these are not insurmountable. Already the woman welfare worker is meeting with success in raising the mental tone of the home and factory. She may be trusted to develop the outlook of the mother and to ensure a sounder basis for the superstructure of industrial hygiene.

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Chemical Notes.

BY

ALAN W. STEWART, D.Sc., A.I.C.

Demonstrator of Chemistry in The Royal Institute of Public Health.

Prosecutions for Adulteration of Foods, &c. (*British Food Journ.*, vol. xx, Nos. 236-241).—*Preserved Peas:* At the Kensington Sessional Court a fine of £5 and 10s. 6d. costs was imposed for selling preserved peas containing 3·036 gr. of crystallized copper sulphate per pound. *Cream Cheese:* At the same Court a man was prosecuted for selling cream cheese containing 19·215 gr. of boric acid per pound. The medical officer of health considered it was injurious to health for cream cheese to contain more than 17·5 gr. of boric acid per pound, as a preservative. As the vendor proved he had no knowledge of the presence of the preservative, the summons, taken out under Section 3 of the Act of 1875, was dismissed. *Dripping:* At the Lambeth Police Court a man was ordered to pay 2 guineas costs for selling dripping containing 37 per cent. of semi-solid mineral oil. *Treacle:* At the Cromer Petty Sessions a grocer was summoned for selling treacle containing 12·5 per cent. excess of water which had been added. There should be 80 per cent. of solid matter, and the sample in question only contained 72 per cent. A nominal penalty of 1s. was imposed. *Lime Juice:* At Bournemouth Police Court a fine of £5 was inflicted for selling lime juice containing 95 per cent. excess of water. Lime juice should contain 7 to 8 per cent. citric acid and lime juice cordial about 2 per cent., and some sugar. The article supplied was neither lime juice nor lime juice cordial. *Gregory Powder:* At the Bradford City Police Court a fine of £3 was imposed for selling Gregory Powder made with magnesium carbonate instead of the oxide. *Jam:* At the Southport Police Court a fine of £1 was inflicted for selling jam or jelly, the soluble extract of which was less than 63 per cent. of the stated weight. The sample in question contained 50·01 per cent. of water. A sample of black-currant jelly was found to contain 81·6 per cent. of water, 11 per cent. of insoluble matter and 18·29 per cent. of soluble matter. At Woking a man was summoned for selling *marmalade* containing 40·6 per cent. of water soluble extract instead of not less than 63 per cent., being a deficiency of 22·4 per cent. The prosecution which was taken under Order No. 930, Defence of the Realm Act, was dismissed. *Mustard:* At the Kensington Sessional Court, a grocer was fined £5 and 10s. 6d. costs for selling mustard containing 25 per cent. of starchy matter having the characters of wheat flour. This mixture is known as "condiment" mustard. *Egg*

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Powder: At Birkenhead a grocer was fined £3 for selling egg powder containing 41·29 per cent. of calcium sulphate.

The Examination of American-made Acetylsalicylic Acid (P. N. Leech, *Journ. Indus. and Engin. Chem.*, vol. x, No. 4, p. 288).—For purposes of purity acetylsalicylic acid (aspirin) should have a certain melting point, and show absence of salicylic acid by means of ferric chloride, and leave no appreciable ash. There is a wide diversity in the melting point given in various works of reference. The author, as the result of many determinations, found that the melting point of purified acetylsalicylic acid was 131·5° to 132·5° C. Various specimens examined melted between 128° and 133° C. It should be noted that the melting point of the acid is preceded and accompanied by decomposition. If the sample in the melting tube is heated from the original room temperature of the bath to 120° C., the melting point is lower than if the bath is first heated to 120° C., and the melting-point tube then placed in the bath. The author recommends the latter process. The tests given in various pharmacopœias for free salicylic acid as an impurity do not give concordant results. The following method is recommended for the 0·1 per cent. free acid limit test: 0·1 grm. is placed in a dry colorimeter tube, add 1 c.c. of alcohol, then after dissolution 48 c.c. of water and 1 c.c. of fresh 0·1 per cent. ferric chloride made from $FeCl_3$-$6H_2O$. At the same time a control is made by treating 1 c.c. of a "standard" solution prepared by dissolving 0·116 grm. of dried sodium salicylate in water, adding 1 drop of glacial acetic acid and making up to 1 litre. Each cubic centimetre equals 0·0001 grm. of salicylic acid. If within two minutes the colour given by the sample is not greater than that obtained with the "standard," the presence of not more than 0·1 per cent. free salicylic acid is proved.

The Ferrocyanide Method for Estimating Zinc in Bronze (Ernest Nyman, *Canad. Chem. Journ.*, vol. ii, No. 7, p. 185).—Weigh 0·5 grm. of drillings into a 250-c.c. beaker; add 8 c.c. conc. HNO_3 and boil gently to a volume of 3 to 4 c.c. Add 50 c.c. hot water and boil for four minutes, add 20 c.c. of ammonia (1 in 1) and about 1 grm. of ammonium carbonate. Cover the beaker with a watchglass, boil gently for two minutes, filter through a Gooch crucible with the aid of suction. Wash a few times with small portions of NH_4OH (1 in 1), finally with hot water. Transfer the filtrate to a 350 c.c. beaker, acidify with conc. HCl, 10 c.c. in excess, cover with a watchglass and boil till bubbles of CO_2 cease to be given off (a few minutes). Cool to about 70° C. and pass in H_2S into the solution (for ten minutes), the volume of the fluid being 150 to 200 c.c. Filter by suction through a Gooch crucible and wash a few times with hot water. Transfer the filtrate to a 350 c.c. beaker, concentrate the solution by boiling to about 150 c.c. Make ammoniacal to litmus paper, then just acid, heat and titrate at

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67°—79° C. with standard potassium ferrocyanide solution, running in a drop at a time and stirring energetically with a glass rod, using uranium acetate solution (4 per cent.) as an external indicator on spot-plate. The end point is the change, within five to ten seconds, of the greenish yellow colour of the indicator to a very faint reddish brown, when one drop of the solution is brought into contact with one drop of the indicator. The Sb and Sn in the bronze are converted into insoluble oxides by the conc. HNO_3. The NH_4OH and $(NH_4)_2CO_3$ precipitate the Pb as a basic carbonate and Fe and Al as hydroxides. Cu and Zn dissolve as copper ammonium and zinc ammonium compounds.

Analysis of Commercial Dextrines (M. C. Lamb and A. Harvey, *Journ. Soc. Dyers and Col.*, 34, p. 10).—The analysis should consist of the following: (1) Moisture on 5 grm. dried at 100° C. for four hours. (2) Ash from above residue. (3) The water-soluble matter is determined by shaking 10 grm. with cold water; allow to stand overnight, pipette an aliquot part, evaporate, dry and weigh. (4) Reducing sugar is estimated from preceding solution by means of Fehling and calculated to dextrose. (5) Starch is tested for by means of iodine on a portion of the insoluble in cold water. The following standards are suggested: Moisture, 8 to 10 per cent.; ash, 0·1 to 0·3 per cent.; water-soluble matter, 75 to 85 per cent.; dextrose up to 8 per cent. The sample should give a neutral reaction.

Estimation of Lead as Phosphate and its separation from Antimony (G. Vortmann and A. Bader, *Zeitsch. anal. chem.* 56, p. 577).—The following method is recommended for the analysis of hardened lead. A solution containing about 0·3 grm. of Pb is treated with 5 grm. of tartaric acid; render slightly ammoniacal, heat to 80° C., then add 100 c.c. of 10 per cent. ammonium phosphate. The mixture is kept at 70° to 80° C. for twelve hours and, when cold, the precipitate is collected, washed with dilute ammonium nitrate, dried, ignited at a low temperature and weighed. If a considerable amount of antimony is present more tartaric acid should be added. The antimony may be estimated in the filtrate from above by precipitation with hydrogen sulphide.

Detection of Butyric Acid (G. Denigès, *Ann. Chim. Analyt.*, No. 23, p. 27).—Five cubic centimetres of the suspected solution is mixed with 5 c.c. of hydrogen peroxide, 5 vols., and 1 c.c. of ferrous ammonium sulphate made by dissolving 5 grm. of the salt in water, adding 10 c.c. of 10 per cent. sulphuric acid and making up to 100 c.c. The tube is heated at 70° C. for five minutes, add six drops of caustic soda, cool rapidly and filter. To 5 c.c. of the filtrate add three drops of 5 per cent. of sodium nitroprusside. Shake and render acid with acetic acid. A red coloration, due to acetoacetic acid, is produced.

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Analysis of Chloral Hydrate, Chloral Syrup, &c. (M. François, *Ann. des Falsif.*, No. 10, p. 575).—About 2 grm. of the substance is dissolved in 200 c.c. of water. Add an excess of normal caustic soda and after one minute titrate back with normal sulphuric acid to phenolphthalein. Each cubic centimetre of normal NaOH = 0·1655 from chloral hydrate. Provided that the solution is dilute and the time of contact short, secondary reaction between the alkali and chloroform does not appreciably take place.

Rapid Method of Estimating Phosphorus in Bronzes (T. E. Rooney, *Journ. Inst. Metals*, 1918, p. 2).—From 0·5 to 2 grm. of the drillings are placed in a 600 c.c. conical flask, with 20 c.c. HNO_3 and 10 c.c. HCl. The mixture is digested for some time without boiling, until most of the red fumes have been expelled. Care must be observed not to heat too long, otherwise tin may be precipitated. Dilute to about 70 c.c., cool, add 40 c.c. of ammonia (1 in 3), shake, then follow with 35 c.c. of nitromolybdate solution and again shake. Allow to stand for two hours, filter off the precipitate on pulp, wash free from acid. Transfer filter and precipitate back to original flask, add excess of $\frac{N}{20}$ NaOH, mix well and titrate back with $\frac{N}{20}$ H_2SO_4 to phenolphthalein. If working on a 2 grm. sample 1 c.c. of alkali = 0·00337 per cent. of P.

War Emergency Formulæ (W. Partridge, *Analyst*, 43, p. 378).—Owing to the lard deficiency, it was found necessary to allow a substitute to be used in making certain ointments. A satisfactory base known as adeps factitius has been put on the market and is composed of 5 per cent. wool fat, 10 per cent. hard paraffin and 85 per cent. soft paraffin. For olive oil, sesame or arachis oil may be used. For external purposes a special mineral oil known as paraffinum liquidum flavum is recommended. It is pale yellow in colour and fluorescent. Sp. gr. 0·89 to 0·92. Practically odourless and colourless.

Modification of Webster's Test for the Presence of Trinitrotoluene in Urine (Frank Tutin, *Lancet*, 4965, p. 554).—The urine is first extracted with two successive portions of ether; this treatment removes any T.N.T. which may be present accidentally and also chrysophanol. The urine is then acidified with HCl and extracted with ether. During these extractions it is advisable to add alcohol to separate the emulsions. The ethereal extract of the acid urine is then extracted twice with aqueous sodium carbonate, washed with water and then treated with alcoholic potash, when the characteristic violet colour is produced if T.N.T. derivatives are present. If anthraquinone substances are present the sodium carbonate extracts have a reddish-violet colour.

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Bacteriological Notes.

BY

J. H. JOHNSTON, M.Sc.

NEW METHOD OF PURIFYING ENZYMES (J. T. Wood, *Jour. Soc. Chem. Ind.*, 1918, *Transactions*, p. 313).—When safranine solution is added to an extract containing trypsin a precipitate is produced which contains all the proteolytic activity of the extract. It has been generally supposed that this precipitate was a compound of safranine and enzyme, but the author has found that this is not so, and that the precipitate is really a safranine-protein compound which carries the enzyme down with it by adsorption. Upon this principle the author has founded a new method for the purification of enzymes. A weighed circle of filter paper is soaked in the impure enzyme extract and then dried quickly in a current of hot air. It is now re-weighed and thus the weight of impure enzyme taken is obtained. The paper is immersed in water for fifteen minutes, when the enzyme readily dissolves and yields a clear solution on filtration. The filtrate gives no precipitate with safranine and contains all the enzyme activity of the original. In a particular case, 0·23 mgm. of solid in the filtrate was as active as 0·35 mgm. of solid in the original extract, showing a removal of 35 per cent. of non-enzyme matter. The method has been applied to commercial trypsin and to an extract of pancreas. The nitrogen content of the purified enzyme has not been determined. If the method proves to be of general application, it should offer further opportunities of obtaining more certain knowledge of the nature of enzymes and their constitution.

SUBSTITUTE FOR LITMUS IN MILK MEDIA (W. M. Clark and H. A. Lubs, *Int. Rev. Science* and *Pract. Agric.*, 1918, p. 990).—The tinting of milk media with litmus solution as an indicator of the production of acidity in subsequent cultures has always offered difficulties in practice. There is the difficulty of the preparation of a pure and strong litmus solution, the difficulty of the fading of the colour during sterilization of the medium, which involves waiting for the colour to reach its proper depth before use, and the difficulty of the reduction of the colour by some bacteria. The substitute proposed is dibromo-orthocresol-sulphophthalein. This substance does not lose its colour during sterilization, nor is it reduced by the growth of bacteria. Its colour is affected only by change in the hydrogen-ion concentration of the medium. Its changes of colour could be depended upon therefore to indicate true changes in reaction. Unfortunately the compound is not yet on the market on the large scale.

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Pasteurization of Milk (C. Barthel, *Abstracts of Bact.*, 1918, p. 135).—In pasteurization of milk on the commercial scale, it is usual to make the process a continuous one, the stream of milk being maintained at the pasteurizing temperature; for example, 80° C., momentarily only. The author has investigated the effect of a longer time at a lower temperature. It was found that there were no important changes in the chemical composition, the taste, and the physiological characteristics if the milk was heated at 60° to 64° C. for twenty to thirty minutes. As a bacteriological test of the efficiency of the method, its effect on the tubercle bacillus was investigated, this being the commonest pathogenic organism in milk. Usually a litre of milk from a tubercular udder was mixed with 100 to 250 litres of market milk, and the mixture was pasteurized in a commercial apparatus for periods of ten, twenty, thirty and forty-five minutes at temperatures of 60° C. and 63° C. (about 140° F.). None of the forty-four guinea-pigs inoculated with the pasteurized milk developed tuberculosis, whilst all the twenty-six animals inoculated with the milk before pasteurization did so. The method, therefore, is an efficient one.

Microscopic Plate Cultures (F. M. Bachmann, *American Journal of Botany*, 1918, p. 32).—Frost's method for obtaining rapid counts of the bacteria in milk has been extended to other organisms as follows: Grease-free slides are selected and are sterilized in the flame. The temperature of the slides should be kept above the solidifying temperature of the medium to be used. In the case of agar, the melted medium is allowed to cool to 45° and is then inoculated. About 0·05 c.c. of the inoculated agar is placed on one of the slides, the other one placed on the top of it, and the two are drawn apart with a sliding movement. The slides are now placed in a moist chamber which is incubated until the colonies have grown to the desired size. The films are then fixed and stained, examined under the microscope, and the colonies counted.

Direct Counting of Bacteria (P. W. Allen, *Journ. Infectious Diseases*, vol. xxii, p. 245).—A little aluminium hydrate suspended in water is added to the fluid in which the bacteria have to be counted, e.g., milk. The mixture is centrifuged and the sediment transferred to a slide and dried. The aluminium hydrate shrinks on drying and leaves a thin film. This is stained with methylene blue and examined with an oil-immersion lens. The number of bacteria in a square centimetre is counted. The film contains 95 per cent. of the bacteria in the sample.

The Effect of Freezing on the Organisms of Typhoid Fever and Diphtheria (United States Government *Public Health Reports*, 1918).—As the result of epidemics of typhoid fever and diphtheria being traceable to infected ice-cream, an investigation was made into the effects of freezing on pasteurized cream inoculated with the specific organisms.

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After ten days' freezing, practically as many *Bacilli typhosus* were alive as at the start, and the bacillus could be isolated in decreasing numbers for two and a half months. In the case of the *B. diphtheriæ*, virulent bacilli were isolated from the frozen cream after four days. It would thus appear that the mere fact that ice-cream has been frozen is no bar to its acting as a source of infection.

Pneumococci and Streptococci (P. W. Aschner, *Journ. Infectious Diseases*, vol. xxi, p. 409).—An investigation was made into the differentiation of organisms of the pneumococcus and streptococcus groups for clinical diagnostic purposes. Of the points usually determined, it was considered that the precipitin test and inulin fermentation were very reliable, and that the bile test is most reliable for differentiating the pneumococcus and *Streptococcus mucosus* on the one hand from hæmolytic and non-hæmolytic streptococci on the other. Usually, if an organism does not precipitate, it is either a pneumococcus or *S. mucosus*, and the capsule stain and the character of the growth on blood agar will determine which of these it is. If the organism does precipitate, it is almost certainly a streptococcus, and the growth on blood agar determines whether it is hæmolytic or non-hæmolytic.

Transportation of Water Samples for Bacteriological Examination (Albert, Hinman and Jordan, *Amer. Journ. Public Health*, vol. vii, p. 1010).—Investigations were made into the nature and extent of the bacterial changes taking place in uniced water samples when kept. The results obtained pointed to the necessity of samples being properly packed in a sufficient quantity of ice before transportation to the laboratory.

Organisms in Water Surviving Chlorine Treatment (M. A. Smeeton, *Journ. Bacteriology*, vol. ii, p. 355).—Owing to the increasing use of chlorine in sterilizing drinking water supplies, even on the large scale, it is important to know the nature of the organisms which survive this treatment, apart from their mere number. Such an investigation has been carried out on the water supply of New York, which had been treated with 0·5 part per million of available chlorine in the form of calcium hypochlorite. Of 105 organisms isolated from the water after treatment, 66 were liquefying spore-forming bacilli, 23 were non-liquefying spore-forming bacilli, 11 were non-spore-forming bacilli, and 5 were micrococci. It is satisfactory to find that no intestinal organisms were present.

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Reviews.

A Map showing the known Distribution in England and Wales of the Anopheline Mosquitoes, with Explanatory Text and Notes. By W. Dickson Lang, M.A. London, 1918: British Museum (Natural History), Cromwell Road, S.W. Pp. 63. Price 2s. 6d.

Three species of *anopheles* are indigenous to Britain, two of which are known to be malaria carriers, viz., *Anopheles maculipennis* and *Anopheles bifurcatus*. The object of the present map, which the author has taken great care and pains to draw up, is to show what is known of the distribution of the three species of anopheles in England and Wales. This knowledge is very important at the present time as there are a considerable number of infected soldiers in this country who constitute a source from which malaria may possibly be spread through the mosquitoes, if appropriate measures are not taken. There are many blank parts in the map where no researches have ever been undertaken and where investigation is desirable. As a counterbalance, however, there are many large districts which have been systematicdlly searched and much good work done through the action of the medical authorities of the Local Government Board and the War Office. As to its range *anopheles* is likely to be found in suitable places all over this country and is probably most abundant in the lower reaches of the larger rivers and in low-lying tracts of marshy ground. Mr. Lang is to be congratulated on the production of a valuable map and his contribution to a question which may become prominent in the near future.

Sir William Ramsay as a Scientist and Man. By Professor T. C. Chaudhuri, M.A. Calcutta, 1918: Butterworth and Co (India). Pp. 66. Price 1·80 rupees.

This short biographical sketch of the life and work of Sir William Ramsay will give Indian students a good idea of the man and his position as a chemical research worker and discoverer. This monograph has been produced owing to the author being requested to write a memorial essay for the Rajshahi College magazine. As the dimensions of the manuscripts grew to a fair size, it was suggested they should be published in their present form. The monograph is printed in clear large type, and at the end is a useful appendix containing a list of his papers which will prove acceptable to those desirous of reading the originals. The publication of this monograph is an excellent sign of the awakening in the East of science and chemistry and is a warm appreciation, in our Indian Empire, of the work of one who was a master-builder of the structure of modern chemistry.

Syphilis and Public Health. By Lieutenant-Colonel Edward B. Vedder, M.A., M.D. Philadelphia and New York, 1918: Lea and Febiger. Pp. 315. Price $2.25.

In this work the author has collected as much information as possible with regard to the prevalence of syphilis, more particularly in the United States, both by searching the literature and by original investigation. It is addressed primarily to the medical profession, and is based upon practical knowledge of Army procedures. The first chapter contains a very complete account of the prevalence of syphilis, with statistics, and at the end a useful summary is given. Chapter II deals with the sources of infection and methods of transmission. The remaining two chapters are devoted to personal prophylaxis and public health measures. The author lays much emphasis on the importance of better diagnosis of syphilis, and that treatment should be more thorough and accessible. He realizes the importance of education as a preventive of immorality, and consequently of venereal diseases; he fears, however, the effect of general sex education of the young. An appendix contains the technique of the Wassermann reaction and the Australian laws for the control of the diseases. This book will

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prove invaluable to practitioners, social workers, and health officers. It contains in a concise form all that has been done in the investigation of syphilis in recent years.

Genito-urinary Diseases and Syphilis. By Professor Henry H. Morton, M.D., F.R.C.S. London, 1918: Henry Kimpton, 263, High Holborn. St. Louis: C. V. Mosby and Co. Fourth Edition. Pp. 807. Price 36s.

In the fourth edition of this well-known work opportunity has been taken to revise and enlarge the text matter. The author gives in a concise form the present status of genito-urinary diseases and syphilis. This book has enjoyed a well-deserved popularity both with physicians and students from the time it was first produced. In the new edition under review all obsolete matter has been eliminated, and the new and approved methods for the treatment of these diseases have been embodied. Although the war interrupted research work, certain plans of procedure have been perfected and rendered more available. Amongst these may be mentioned the application of the high frequency current in the treatment of benign tumours of the bladder, and the use of radium in carcinoma of the bladder and prostate. Several new details have contributed to the reduction in the mortality of prostatectomy. The whole subject is concisely and comprehensively treated, and the needs of the practitioner and student at all times are well borne in mind. Particular stress is laid on the relation between pathological conditions and symptoms arising from them, and the X-ray treatment of syphilis, together with all other approved methods, figure prominently. Chapters on gonorrhœa in women, by Dr. A. M. Judd; on the Wassermann reaction, by Dr. A. Potter, and on the bacteriology of the gonococcus, by Dr. J. H. Burke, have been contributed. The book is well got up, and printed on glazed paper: to the publishers is due much credit for the 330 fine illustrations and the 36 full-page excellent coloured plates. This is a standard work on genito-urinary diseases and syphilis, and is indispensable to both students and physicians.

The Third Great Plague. By Professor John H. Stokes, B.A., M.D. Philadelphia and London, 1917: W. B. Saunders and Co. Pp. 204. Price 6s. 6d.

The purpose of this book is to put the facts regarding syphilis in such form that they will readily become matters of common knowledge; it is written for everyday people, and should do much to awaken public opinion for co-operation in the campaign against the third great plague, viz., syphilis. Just as we have crippled the power of tuberculosis through widespread universal knowledge, the author is hopeful that in time cancer will be stamped out, and syphilis eventually eradicated. As soon as syphilis becomes a household word, its power will be gone. The story of the conquest of syphilis is one of great names, thoughts, visions, and epochal achievements. It is not the tissue of loathsomeness that common misconception makes it. This writer has made a distinct and welcome contribution to the new and increasing literature which aims at conveying accurate and adequate information; this he has given in a readable manner, and in such fashion that it will appeal to the ordinary reader much more than is usually the case with books on this subject.

Syphilis: Diagnosis and Treatment. By Loyd Thompson, Ph.B., M.D. Philadelphia and New York, 1918: Lea and Febiger. Pp. 415. Price $4.25

The author, in preparing this book for the medical profession, has treated the subject of syphilis in a practical and intelligent manner; a considerable portion of the text matter is consequently devoted to the diagnosis and treatment of the disease. Of the many interesting chapters, special mention must be made of the seventh, dealing with laboratory diagnosis; it is very complete, and contains much useful data and technique. The necessity of laboratory aid is increasingly becoming evident for the successful treatment of syphilis more so than for any other disease. Theoretical matters and those of historical interest are discussed, but only when they have some bearing upon the practical handling of the subject. Whilst primarily written for the medical man, it will prove valuable to the sociologist, teacher, minister, parent, and business man, as it is written simply,

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and yet scientifically. Much credit is due to the writer for having assembled so much material concisely and systematically in the small compass of his book. His exceptional experience has enabled him to write an authoritative and very practical work. There are seventy-seven excellent engravings and seven good coloured plates, illustrating the principal types of lesions of the skin, mucous membrane, bones, joints, &c.

The Wassermann Test. By Lieut.-Colonel Charles F. Craig, M A., M.D. London, 1918: Henry Kimpton. St. Louis, U.S.A.: C. V. Mosby & Co. Pp. 240. Price 15s.

In this work the author places upon record his experience gained from nearly ten years of personal use of the technique and diagnosis described. Some of the subjects considered are: factors influencing the result of the test, preparations and titration of the reagents used, author's modification of the Wassermann technique, complement fixation in syphilis with antigens prepared from pure cultures of *Treponema pallidum*, interpretation of results, the effect of treatment upon the Wassermann reaction, and the use of the latter for the examination of cerebro-spinal fluid. The author rightly emphasizes the fact that much of the misunderstanding and confusion among physicians in regard to the value and limitations of the test are due to its being done by inadequately trained assistants, causing erroneous results. The test should always be carried out by competent serologists, and the author insists on its value both for the examination of the cerebro-spinal fluid and the blood in all syphilitic patients. In addition to the good colour plates and half-tone engravings, there is a full bibliography. This is an excellent monograph for syphilographers; it covers the whole subject in a masterly manner, and is written by an expert. It is an authoritative book, which all pathologists and serologists should possess.

Low's Handbook to the Charities of London. London and Edinburgh, 1918: Sampson Low, Marston and Co. Pp. 254. Price 1s. 6d.

This is the eighty-third year of publication of this well-known handbook; it gives the objects, date of formation, office, income and expenditure, treasurers, secretaries, &c., of over 1,200 charitable and other beneficent institutions. The information given has been obtained from the latest reports, and this handbook fully maintains its reliable reputation.

Boyle's Court Guide, 1919. London: 48, South Audley Street. Pp. 1,138. Price 7s. 6d.

This familiar "Red Book of London" has now reached its two hundred and fifty-third edition. Apart from the 1,008 pages of streets, names, and addresses which constitute the main part of the Guide, there is a very useful addenda comprising 134 pages, giving information about ambassadors, consuls, &c., the Privy Council, the House of Lords, House of Commons, List of Constituencies, Government Offices, Clubs, Societies, and Institutions. This is a handy and indispensable reference book, and should be in the hands of every one desirous of securing the addresses of the nobility and gentry, with the least expense of trouble.

NOTE.

We have received from Messrs. Genatosan, Ltd., 12, Chenies Street, W.C. 1, a sample of their "Genasprin" tablets. Acetyl-salicylic acid, commonly known as aspirin, was before the war a German-made product. The purity of aspirin is an important factor, especially if its dissolution is required to be delayed until the drug has reached the alkaline intestinal juice. We find that Genasprin complies with the tests prescribed in the British Pharmacopœia. No free salicylic acid nor acetic acid could be detected; there is no doubt that this is a preparation of the highest quality. It is to be hoped that British manufacturers will continue to produce and maintain the excellence of these fine chemicals which have hitherto been supplied by enemy countries. Genasprin is put up in neat bottles containing thirty-five five-grain tablets. Price 2s. Aspirin is useful for colds, influenza, neuralgia, and uric acid disorders.

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INFECTION AND DISINFECTION IN WAR TIME.

BY

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A Lecture delivered at The Royal Institute of Public Health.

IN the time at my disposal it will only be possible to deal with the merest outline of the subject, and, therefore, I have decided to confine my remarks to one aspect of the problem, viz.: the transmission of disease by the "carrier."

The problem of the carriage of disease by infected individuals is not a new one, but during the war, when men of all classes and from different parts of the world have been brought together in large masses, the "carrier" question has become of very great importance and has demanded our very earnest consideration. In the past, we have largely been concerned with the typhoid carrier, and, in fairness, it must be said that the first real work on the typhoid carriers was done by the Koch school, and the intestinal carrier—the most important because the most frequent type—undoubtedly came to light as a result of the campaign in south-west Germany. More recently, and particularly during the war, it has been abundantly proved that the intestinal carrier is not confined to typhoid fever, but that other infections of the intestinal tract—paratyphoid fever, dysentery, cholera, &c., have their carriers too. As most of the past work has been on the carrier of typhoid fever, it is natural that most of the evidence we have of prolonged carriage of the bacteria has been furnished by a study of this disease, and, therefore, most of the statistical evidence I shall bring before you is taken from the literature of this disease. The whole subject of the "typhoid carrier" was gone into very fully by Ledingham [1] in a report to the Local Government Board in 1910, and evidence brought forward since that date has largely confirmed his results and his conclusions. It has been clearly established that typhoid bacilli may be found in the intestinal discharges in two great groups of cases.

(1) Those who have recovered from typhoid infection.

(2) Those who have never had any symptoms of typhoid fever.

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In both groups, the excretion of bacteria may exist for only a short period or may be practically permanent. Semple and Greig [2], working among typhoid in the Indian cantonments, found in the examination of eighty-six convalescents that 11·6 per cent. showed typhoid bacilli in their fæces for longer periods than three months. Prigge [3] reports that at the Saarbrücken Institute during three years 10,841 persons were examined and eighty-four carriers were discovered; some of these discharged bacilli up to one year and others for a longer period. Of these carriers, twenty-four were in persons who had had no symptoms of typhoid fever, three were in patients whose symptoms did not supervene till eighteen, nineteen and twenty days after the bacilli had been found, and the remainder were in recovered patients. Though the same accurate statistics are not yet available in regard to other intestinal infections, it may be said that the evidence already accumulated shows that, where similar examinations have been carried out for paratyphoid fever and dysentery, similar results have been obtained. Thus, this year, Reismayer reports an examination of 121 "carriers" of paratyphoid fever and states that this carrier state may last from six months to fifteen months. Dysentery "carriers" have long been recognized, and it is interesting to record an official (Bavarian) order issued during the war, on the campaign against dysentery. "As a general rule every case of non-sanguineous diarrhœa occurring in warm weather is to be taken as dysentery, notified and treated as such. Isolation of cases and speedy disinfection should, in particular, be resorted to and a systematic inquiry conducted, for this will enable the discovery of milder cases, as of old cases unrecognized previously." This, in its last sentence, is an attempt to get at those who are not showing definite symptoms—"the carriers." Inman and Lillie state in the *Lancet*, 1917, that of the dysentery convalescents invalided from France between 10 and 24 per cent. were carriers of *Entamœba histolytica* cysts, and all those who have worked on this subject have had evidence not only that the amœbic form shows its carriers, but that this is also true of the bacillary form. Dean [4] and his collaborators, in an examination of 488 cases from the Mediterranean Force, found rather more than 6·5 per cent. of carriers—and these included infections with *Bacillus paratyphosus* A and B, *B. dysenteriæ* (Flexner and Shiga) and *E. histolytica*. I need not labour this point, for I have said enough to establish my thesis

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that in these intestinal diseases, which have been more or less prevalent in the war zone, a certain varying proportion of cases must be regarded as infective agents after the actual symptoms have disappeared, and that this carrier period may vary from a few months to several years. Further, it has been shown that these intestinal carriers exist among people who have shown no symptoms of the disease. A proportion of these have been in some way intimately associated with infected persons, but in other cases this association cannot be traced. Workers in the Liverpool Tropical School [5] have recorded that of 785 persons who have never been out of Great Britain almost 3·5 per cent. harboured in their fæces cysts morphologically indistinguishable from *E. histolytica*, and other observers have noted a similar condition in relation to bacillary dysentery.

But intestinal diseases are not the only ones in which this carrier question is of importance. For many years the prevalence of *B. pneumoniæ* and *B. diphtheriæ* in the throats of healthy persons has been known, and in the recent outbreaks of cerebrospinal meningitis, it has been the official practice to examine the naso-pharynx of all contacts. Bassett-Smith [6], in the examination of 4,713 healthy non-contacts, obtained positive results from 1·124 per cent. of cases, whereas in fifty-two healthy contacts with cerebrospinal fever his percentage was 5·77. In Reading, Donaldson found 11 per cent. of carriers among contact cases. Others have found 20 and 22 per cent. My own experience in the North has shown a much smaller percentage. During 1916-17 I examined 1,140 contacts, and found only forty-five positive, i.e., 4 per cent. Of these nineteen were in a batch of new recruits sent from an area in which cerebrospinal fever was prevalent. Out of 100 cases taken from various camps in my area and in which no cases of cerebrospinal fever had occurred, I did not find a single positive. In 1917-18 I examined 472 so called contacts and only twenty were positive, i.e., under 5 per cent. If one analyses these results further one finds that all the positive cases were from 203 contacts, the only ones who were proved to have been associated with definite cases of cerebrospinal fever—making the percentage of 10. A further analysis shows that nineteen of these positive contacts of the year 1917-18 were from a batch of sixty-eight men who had been living together in tents — isolated because of mumps or measles. This high percentage, of almost 28 per cent., was from

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cases crowded together and from men in a low condition of vitality resulting from their attack of infective disease. This question of crowding I shall refer to later. Sufficient has, I think, been said to show the prevalence of these carrier cases, and I hope to be able to prove their importance in the spread of disease. Again, the most authoritative evidence we have is in the case of typhoid fever, but there is very little doubt that when all the facts brought out in relation to paratyphoid fever, dysentery, epidemic cerebrospinal meningitis, &c., are collected and examined, we shall find similar evidence of these carriers being infecting agents.

Let me give a few facts in regard to typhoid fever. Dr. Niven [7] of Manchester recorded in 1908 the discovery of a carrier in the person of a woman who kept lodgers and did her own housework. The cases ascribed to her are :—

(1) September 24, 1908. Male lodger (36 years), developed enteric fever four days after leaving the house.

(2) September 7, 1907. Male lodger (19 years.)

(3) September 4, 1906. Male lodger (28 years), died of typhoid fever.

(4) May 2, 1906. Male lodger (28 years), died of typhoid fever.

Huggenberg [8] records that no less than thirteen cases occurred in one family over a number of years, and all attributable to a female carrier. Anyone who has had some years' bacteriological experience must have met similar cases. Recently in a small Lancashire village in which there had been scattered sporadic cases of typhoid fever over a period of five or six years, I was able to trace a carrier in a dairyman who had had typhoid several years previously. Perhaps one of the most interesting cases is a female carrier reported by Irwin and Houston [9]. She had enteric fever seven years previously. At that time she was a domestic servant near Liverpool. After her recovery, she took another situation in the same town and a month later the master of the house developed typhoid fever. During the next two years no other cases attributable to her were recorded. She then went to Liverpool, and the son of her mistress developed enteric fever. Finally she went to Belfast, and while in service there, four people living in the same house with her developed typhoid. Thus in seven years, six people living in the same house with her contracted this disease. On examination, her urine was found to contain large numbers of typhoid bacilli, and her blood gave an

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incomplete agglutination reaction to *B. typhosus*. Numerous other cases could be cited which prove beyond doubt the infectivity of carriers of *B. typhosus*, but the position is well summarized by Mayer [10], who states that in a certain region in Bavaria there were from 1904-07 495 endemic cases of typhoid fever, and that 160 or 32·3 per cent. of these were traced directly to seventy-two infective carriers. This work was carried out in the most complete manner, and can, I believe, be taken as an accurate estimate of the position in relation to typhoid fever.

With dysentery the evidence is not so striking, but there is little doubt that cases which have occurred during the war in areas in which dysentery was not an endemic disease have been due to the presence in these areas of men brought from the dysentery zones, either infected individuals who have shown no symptoms of the disease or individuals who have been infected but who are not cured. In the recent (1917-18) report of the Medical Officer to the Local Government Board, Dr. McNalty reports on dysentery in London. I need not go into the details of these cases but content myself with quoting Dr. McNalty. In summarizing his investigations he says:—

"All forms of dysentery are spread from the sick or from the healthy carrier of dysentery infection by means of conditions which permit fæcal matter of recent human origin to reach the alimentary system of the person infected"; and again, "It is advisable, however, for all local health officers to reckon with the possibility, that in the civil population under their charge there may be during and after the war persons who carry the infection of bacillary dysentery, and that given the necessary opportunities, cases of dysentery, or even a definite outbreak of dysentery, may arise in consequence."

"The presence of dysentery in the Forces abroad, entails an additional risk of such introduction (i.e., by carriers) by means of soldiers returned home on leave or under hospital treatment. In the present instance there were some reasons to suspect that such introduction of infection might have occurred."

The cure is a difficult matter and even the fairly rigid standard which is adopted in the examination of dysentery cases must allow the escape of a considerable number of uncured cases. It is recognized by all workers on the subject that intermittent discharge of the organisms in the fæces, even with the lapse of considerable

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periods of time, is not uncommon. The examination, therefore, may be made at the time when the fæces are free and the man may be discharged as cured who even the next day may be discharging bacilli in his fæces. This point is well illustrated in connexion with Lamblia infections, by Dobell [1] in an examination extending over fourteen weeks. In each week there were from one to six days in which Lamblia were not found, but they were present the whole time and were found at least once every week. To quote Dobell: "If three examinations only had been made at weekly intervals during the first three weeks then the case would have been found *uninfected*, if the examinations had been made on Saturday or Wednesday, but *infected* every time if they had been on Sunday or Monday." In the other weeks a similar result would have been obtained. Of ninety-eight examinations there were thirty-seven positive findings, and sixty-one negatives. There are authentic reports where ten, fifteen, sixteen, eighteen, and even thirty-five examinations have been made on individual cases before a *Lamblia* infection has been discovered. The same is true of infection with *E. histolytica*. Thus the Liverpool Tropical School record a case which was examined forty-three times—positive twenty-two, negative twenty-one—and another which was found positive only once in twenty-three examinations. These irregularities are partly explained by the intermittent discharge of the parasites, but also by their irregular distribution in the stools. Dobell records the following three cases:—

(1) Six preparations were made from the same stool and the cyst which is the infecting agent in the carrier, was present in the following numbers in each preparation: 0, 0, 0, 0, 4, 4.

(2) Another case with eight preparations; results: 0, 0, 0, 0, 0, 0, 1, 0.

(3) Another case with nine preparations; result: 0, 1, 1, 0, 0, 2, 0, 0, 225.

During treatment the negative phase in the examination is very marked. Thus of twenty-one treated cases in one series sixteen were found negative during and immediately after treatment, although all were very regularly found positive during the untreated period. From what I have said it must be clear that "carriers" may be very easily overlooked, and distributed as they must be among the general population they may become a centre of infection.

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One other disease calls for special mention here—epidemic cerebrospinal meningitis. Statistics are hardly necessary. The "carrier" in this disease is as well recognized as the carrier in enteric fever—and we have established "carrier centres" where these infecting agents may be collected. The carrier rate varies in different centres and in my own area it has been comparatively low, but there seems to be no doubt that the "carrier" in crowded transports and in crowded camps is a danger, and my recent experience has proved his power of infecting others. In one hospital in my area a nurse developed cerebrospinal meningitis. I examined the nasopharynx of the patients in all of the wards, the nurses, sisters, &c., and there were only two men in whom I found meningococci—both wounded men but otherwise quite healthy. Both of these patients were in the ward controlled by this nurse and one of them proved to be a fairly resistant carrier. It was several weeks before his throat could be declared free. The probabilities were that this man was the infecting agent.

In another hospital an extremely virulent case occurred. Again all the patients in the ward were examined as well as the staff. Only two gave any evidence of meningococci, one of these was the orderly who had been in attendance on the patient and the other was a patient in the adjoining bed. Both of these cases cleared very rapidly. Infection from individual to individual is quite common but recently a very striking case came under my notice. A lady suddenly developed symptoms of cerebrospinal meningitis and died in a couple of days. I obtained a meningococcus, Type I, with agglutinins to Type III from her cerebrospinal fluid. All the members of the household were examined, and two infected persons found—the husband and the daughter—the only two who had been constantly with her and had kissed her. The organism isolated from the nasopharynx of the daughter died before I could determine its type, but that from the father proved to be a Type I with agglutinins for Type III. I have no doubt that here again we have a passage from individual to individual. Numerous other cases could be given but these are sufficient to establish my contention that the organisms are carried from individual to individual. It is true that very few of these "carriers" have developed the disease, but we are very largely ignorant of the causes which determine actual infection, and there are a number of cases recorded where the actual attack of the disease had been traced, as far as such

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cases can be traced to a definite carrier. Several cases of this kind are reported by Colonel Reece in the appendix to the report of the Medical Officer to the Local Government Board, 1917-18.

How are the organisms carried? In the intestinal infections we have abundant evidence of the infection of foods (milk, &c.), by the carriage of fæces and their contained bacteria by flies, &c., and in the war zones there is no doubt that this method is responsible for various outbreaks. I need say nothing of the infection by imperfect drainage in urban and rural districts, but there is one side of the question to which I think sufficient attention has not been paid. We are familiar with the endemic occurrence of infectious diseases in institutions such as asylums, workhouses, private schools, &c. Here you have intimate contact prevailing among the inmates. When an outbreak occurs, the water supply is investigated, the drainage is inquired into, the food is examined and, now-a-days, a search is made for the carrier and particularly among the kitchen, dairy and laundry staff. In many cases the carrier has thus been traced and outbreaks which have occurred irregularly for years have completely ceased after the removal of the carrier. There is one source which to my mind is generally neglected and that is the "water closet." In how many cities or institutions is the water closet disinfected after use by each individual. Just for a moment consider what happens even with the most cleanly. The excreta drops, it may be mainly into the water in the pan, often on the sides—the flush clears most of it away, but an examination of the water would always reveal the presence of fæces and their bacterial content. The next individual comes, the excreta drops again and the water is splashed often on to the person—the clothes become contaminated and you at once realize a source of infection. With the unclean how much greater the risk is and where in institutions you have clean and unclean using the same conveniences it is easy to understand how one infects another. Roehling, in 1895, drew attention to the fact that in the act of flushing a powerful spray is caused, and this conveys droplets within a wide area. He experimented with methylene blue and *B. prodigiosus* and found abundant growth on plates exposed at a distance of one metre and at a height of 50 cm. above the seat. It has been stated that the seat, the cover, and the chain handle in a w.c. are as a rule contaminated with *B. coli*. If this is the case, and where I have made examinations

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this statement has proved to be true, it follows that with carriers of *B. typhosus*, *B. dysenteriæ*, &c., using the w.c. these organisms may also be found in these situations. The clothing and the hands may thus become infected and you have a fruitful source of spread.

In regard to cerebrospinal meningitis and infections in which the causal organisms are lodged in the throat, e.g., influenza and pneumonia—the infection takes place by the spray produced in the act of coughing, sneezing, or even speaking. The area of this spray is a limited one, and, therefore, the infection takes places in crowded trains, trams, 'buses, &c., in crowded rooms, and places of public amusement, &c., where people are brought into close connexion with one another. Much evidence has been brought forward recently to show that the outbreaks of cerebrospinal fever which have from time to time occurred in this country have found their origin in crowded transports or crowded camps. Johnston and Treadgold, working in one of our military areas, found in an examination of 1,142 contacts that the carrier rate, where there was marked overcrowding, was 20, where there was moderate overcrowding 11·3, and where there was no overcrowding 6. Captain Johnston adds that given overcrowding the tendency is for the largest percentage of positive contacts to be found in large rooms especially when they are used for meals as well as for sleeping. Sir Arthur Newsholme showed that as the result of the examination of 1,881 non-contact persons, mostly civilian hospital patients, during two years (March, 1915, to February, 1917), the percentage of carriers ranged from 2 per cent. among Kentish rural school children to 37 per cent. among Cambridge workpeople. If we compare these results with those obtained among soldiers in the London district it would seem that the general military carrier rate during the last quarter of the year 1917 was two and a half times greater than the civilian rate. Professor Walker Hall found that in billets with a floor space of 30 square ft. per man the carrier rate was 28, in huts and barracks with 50 square ft. it was 8·5, and in hospital wards it was 3·1. Glover gives numerous examples to show the relationship between overcrowding and the meningococcus carrier rate, and to only two of these shall I refer:—

(1) An old barrack (peace strength of sleeping room twenty-four), at time of examination, thirty-four to thirty-nine were sleeping in these rooms—carrier rate was 28.

(2) Old barrack room — no overcrowding — every man had at

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least 60 square ft. floor space—carrier rate 8. These two are typical examples out of a dozen that he records, and among his conclusions he states: "A high carrier rate usually denotes overcrowding and dangerously unhygienic conditions, even though no cases of the disease may have recently occurred."

This question of overcrowding is of special importance in relation to such diseases as cerebrospinal meningitis, influenza, pneumonia, and possibly scarlet fever and measles. We are all familiar with the association of the crowded school room with infective diseases, and the numerous cases of infective diseases which have occurred in some of our camps and on board transports is striking evidence in support of this contention. My experience recently has been mainly in connection with cerebrospinal meningitis. Glover, with whom I agree, says that overcrowding has at least a threefold importance as a factor in the production of cerebrospinal fever epidemic.

Firstly, the atmosphere of an overcrowded and ill-ventilated room or hut, by lowering the individual resistance, tends to favour the chances of the meningococcus attacking the meninges with success.

Secondly, by shortening the distance between man and man, overcrowding facilitates the transmission of infections of the upper respiratory passages, since these are present in droplets of secretion, which are liable to be sprayed out into the surrounding air in the acts of coughing, sneezing and loud speaking. For this reason, overcrowding favours the occurrence of catarrhal diseases which so frequently precede and accompany an outbreak of cerebrospinal fever.

Thirdly, for a similar reason, overcrowding tends to produce a high carrier rate of the meningococcus in a community: thus ensuring to any susceptible individual freshly introduced a massive dosage of the organism.

There is no doubt that associated with this overcrowding there is the question of lowered resistance from strenuous exertion; the fatigue which necessarily accompanies the entrance into barrack life—and that which necessarily is associated with influenza, measles and other acute infective diseases.

My own experience during the last two years has been that the majority of the cases of cerebrospinal fever have occurred among young recruits, and especially where overcrowding has taken place,

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and that the carriers almost wholly were found amongst those associated with these. Thus, as I have already indicated, nineteen out of forty-five positive carriers which I found in 1916-17 were in a batch of new recruits who had travelled together in a crowded train from an area in which cerebrospinal meningitis was prevalent. One of these recruits developed typical symptoms of the disease the day after his arrival at camp—and the nineteen carriers were in association with this man. Again this year, nineteen out of a total of twenty-nine carriers were from a batch of sixty-eight men who had arrived in a crowded transport, and who were isolated in a tent with mumps and measles. On that transport when she arrived in port there was a definite case of cerebrospinal meningitis—though all the nineteen were not infected from that patient, as the type of organism differed in different cases, but they all came from a camp in which cerebrospinal meningitis was rife. One of these men actually developed the disease three weeks after arrival in camp.

The comparatively small number of cases of cerebrospinal meningitis which have occurred in the camps in my area, the few carriers (excluding those directly introduced by transports or otherwise), and the rapid freeing of positive contacts in camps and hospitals has been rather striking. This may be due partly to climatic conditions, our main camps being in open country, and many of them on sandy soil and exposed to the breezes from the sea, but I believe the freedom has been largely due to the absolute absence of overcrowding. One of the striking features too has been the rapidity with which infected contacts have cleared up. Rarely have I had cases which were not clear on the second or third swabbing, and in many cases the freedom from apparent infection has been so rapid that I have myself taken special swabs to confirm results—and in such cases the nasopharynx has been thoroughly swabbed from side to side. To me there is little doubt that the method of treatment adopted—and this I shall refer to later—played some part in this rapid clearing up, but I am convinced that no small part was due to the open and thoroughly healthy position of our "contact centre." Overcrowding probably plays some part in the spread of infective intestinal disorders—e.g., in schools and workshops where many people use the same w.c., &c., or where food is infected by flies, but the problem is not by any means so important in these diseases as it is in the respiratory borne ones.

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With regard to the recent severe outbreak of influenza, though the carrier question has not been specially investigated, it has been established over and over again that the *B. influenza* and its associated pneumococci and the streptococci are found in the throats of healthy people—in fact many competent observers deny that the *B. influenza* (Pfeiffer) is the real causal organism of the various outbreaks of this disease because it is found in only a small proportion of the actual cases, and is moderately common during interepidemic period. Whether this organism be causal or not, there is abundant evidence that the disease passes from individual to individual and that carriers are produced during each epidemic.

If then we admit the carrier, it is not difficult to account for the present epidemic. Look at your trains, tubes, trams and 'buses—the overcrowding is enormous and one or two carriers could infect hundreds. Look at your offices and workshops, the great bulk of them are staffed by older men—many of whom had been leading quiet easy lives but who, through the necessities of the times, have been thrown into strenuous and worrying employment in offices often ill-ventilated and cold—or by girls who are exposed to infection in their journeys to and from the office. How many hundreds, yea thousands, of homes there are in this land where in years previous to the war—the young girls, especially, led an open air healthy life at home—but now have become carriers of infection from crowded city offices and shops, from crowded cars and trains to their homes. We have exaggerated in every way the circumstances favourable for spread of the disease and yet we wonder why these epidemics should come. But at the back of all this there is more. This nation and other nations too were not ready for this epidemic. The resisting power of the nations has been lowered. The tremendous worry which has necessarily come to so many people, the strain of living which has been perhaps the greatest among the so-called middle classes—the people especially with small settled incomes—the food conditions and the conditions brought about by coal shortage, &c., could not but lower the resistance of the people and render them more susceptible to disease. I do not complain of these conditions—many of them are I believe quite unavoidable, but it is no use shutting our eyes to facts and wondering why we have had such a virulent and widespread epidemic. I need not say more on this, for I believe there

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is no one who has, even in a superficial way, studied the social, economic and moral conditions in our great cities to-day—even if he be a food expert who deals only in calories—but will be convinced that lowered vitality of the people has played a great part in preparing a suitable soil for the active growth and development of bacteria or other organisms causal of such an infective disease as influenza.

In view of what I have said, it is obvious that in dealing with the carrier especially of respiratory borne disease, whether in camps or in civil life, the great, if not the greatest problem, before us is how to prevent the carrier from disseminating the bacteria he carries. I realize as fully as anyone that much of the overcrowding, which has occurred in camps and especially in transports, in trains, tramcars, &c., has been unavoidable, but at the same time I am not so sure that we have realized the risks, and taken even ordinary precautions to avoid it. Much has lately been done by the use of sprays, not merely to disinfect the carrier, but to deal with the infected or non-infected contact before he has become a carrier. This suggests itself at once as a proper procedure, but the carrying out of it effectively with a large number of men, is not easy. A steam spray or atomizer was introduced into our military camps for this purpose. The men were passed through a room in which was produced by this apparatus a fine spray of some disinfectant, $ZnSO_4$, chloramine, &c. This disinfectant was inhaled by the men for a varying time, and it was hoped in this way to disinfect the nasopharynx. Much was claimed for this spray, and it was thought it might be employed for all respiratory borne diseases, and some observers recorded good results especially in meningococcic carriers. My own results did not make me an enthusiast, and I was enabled to carry out some experiments in my own laboratory to test the effectiveness of the apparatus.

(*To be continued.*)

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LESSONS OF THE INFLUENZA EPIDEMIC 1918.

BY

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A Lecture delivered at The Royal Institute of Public Health.

THE pandemic of influenza which swept over Europe and the world in the summer and again in the autumn of last year was probably the most formidable of which we have record. Where exactly it took origin is not yet clear and owing to the war and the interruption of international communication consequent thereon the difficulty of obtaining reliable information—particularly from Russia and the central Empires—has been very great. At first it was thought that the starting-point was in Spain but I now understand from Dr. Bruce Low, who has been making a special study of this aspect of the subject, that this is unlikely. As we have in the past looked to the East for much that is good so apparently we must look to the same source for this latest manifestation of evil. The first accounts, however, received in this country came from Spain about May, when it was said a new disease had appeared characterized by high infectivity, rapid spread, short duration (three or four days) and low mortality. Owing chiefly to absence of complications and lack of any characteristic signs or symptoms there was doubt at first as to the identity of the malady—some claiming that it was entirely new but with resemblance to pneumonic plague, others that it was either dengue or sandfly fever. But these speculations were speedily set at rest as the infection spread and all the old familiar features of the 1890 pandemic were reproduced. Its first appearance in Great Britain seems to have been at Glasgow in May, 1918, when outbreaks of acute febrile disease with symptoms resembling those of influenza of a mild type occurred in three factories and one industrial home—436 cases in all but apparently no deaths. A week later, a similar but more severe outbreak occurred in two industrial schools—in which there were eight deaths with all the symptoms and post-mortem appearances that became familiar later on. In these outbreaks some evidence of communication was established. Note was made of

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the fulminant pneumonic character of some of the fatal cases—and also of the failure to isolate or identify the bacillus of Pfeiffer.

In England, the disease first attracted attention in June, when cases were reported from Portsmouth and some of the other coast towns—chiefly, however, amongst the military and naval forces; the civilian population was at first very little affected. In this connection it will be well perhaps to revert for a moment to the experience of the Army in France. According to the report of the Influenza Committee of the Advisory Board to the D.G.M.S., "The epidemic began by a few local outbreaks in the First and Second Armies in April and May, 1918. It appeared both at Rouen and Wimereux in April. At the end of May it re-appeared with great violence in the Second Army" and thence apparently spread to the First, the Third, and the Fourth Armies, and affected a very large proportion of the troops. In the First Army the total admission to casualty clearing stations for influenza between May 18 and July 2 was 36,473 and "these figures take no account of the many thousands of mild cases treated in their own lines or in field ambulances." It is further stated in the same Report that this was not the first time that Pfeiffer's bacillus had appeared in the Armies. On the contrary, it had been frequently found in cases of broncho-pneumonia, especially during the winter of 1916-1917. It is doubtful, however, whether much importance, from the epidemiological point of view, attaches to these sporadic findings of the Pfeiffer's bacillus. In an outbreak of measles and rubella—complicated by purulent bronchitis—which attacked men belonging to a draft of troops from New Zealand between January 1 and March 8, 1918, the *Bacillus influenzæ* was present in twenty-four of the forty sputa examined and was grown in culture in twenty-one cases.

The important fact is that influenza in epidemic form was prevalent in France and in our own Armies as early as April. It is possible, therefore, that the main bulk of the infection was introduced into this country by that route—by convalescents and by men returning on leave. This is little more than a suggestion as it is in the nature of the case difficult or impossible to settle such a question definitely. Influenza being like a spark applied to a highly inflammable material, the conflagration becomes so quickly general and all-devouring that it is impossible to say where the spark alighted. Whatever the routes—and no doubt there

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were many, as instanced by the Glasgow outbreak—by which the infection reached this country its subsequent progress is now more or less matter of common knowledge, and may, perhaps, be best studied in miniature in the form of curves.* These give for individual towns the number of deaths week by week attributed to influenza either alone or as a primary cause. Most of the towns show coincident rise in the death-rate from pneumonia, bronchitis, and other affections of the respiratory system no doubt mainly due to influenza, but these are not included. The most extraordinary feature about these curves is the rapidity with which they rise practically from zero to a high culminating point and then as rapidly descend—all within a period varying from one to about six weeks according to the size and compactness of the community affected. Dr. Meredith Davies records the case of a hostel in Wales accommodating 200 students. Infection was introduced on October 19 on the occasion of a dance attended by some students from an infected institution in the neighbourhood. Four cases occurred on the 20th and within the short space of five days seventy-nine students out of the 200 were attacked and this although all the cases were promptly isolated as they occurred. No further cases occurred after the tenth day. In military camps and similar aggregations the epidemic seems to have run its course in about three to four weeks: in larger towns and rural areas a longer period was covered. But even in the rural districts of an outlying county like Carnarvon, the period was no longer than seven weeks.

In a recent contribution to the epidemiology of influenza, Dr. Major Greenwood drew attention to the form of the curves when plotted from the daily incidence rates—"the rapid and quasi-symmetrical evolution" of the primary curve as compared with the more irregular longer drawn out form of the secondary.

Graphs based on weekly deaths in individual towns do not clearly bear out this distinction. Unfortunately in civil life, in the absence of notification or sickness returns, we have only the death records to go upon, but that these are a fairly reliable index to the progress of influenza morbidity may be deduced from the experience of continental towns, e.g., Nurnberg, Copenhagen, where the disease is notifiable.

* The curves exhibited are unavoidably omitted.

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Although it is difficult to trace the sequence of events in the country as a whole owing to almost simultaneous infection of many large towns, investigation in individual counties shows that a gradual diffusion of infection can be traced from the more populous centres towards the outlying villages and thence to the rural districts mainly along routes of principal traffic. In this rural dissemination fairs and markets played an important part and also schools, churches, dancing assemblies and such like. The rapidity of spread—even to remote rural districts—is "explained" by the short incubation period (rarely more than forty-eight hours) the sudden onset, the high infectivity of the patient during the first days of illness and the fact that practically everyone—old and young—is susceptible. No one seems to enjoy a natural immunity, at any rate when the virus is in its pandemic stride.

A word as to the clinical features of the epidemic. In the summer outbreak the symptoms were for the most part extremely mild—sudden onset of general malaise, pains in back and head; catarrh only occasionally present; a temperature which rarely rose above 102° F. and defervescence at the end of three or four days, leaving little of that lassitude and depression which are ordinarily associated with influenza. As in other mild infections a general reaction of the lymphatic system was occasionally observed. As the epidemic progressed, symptoms became more severe: a tendency to hæmorrhage was noted, epistaxis, blood-stained sputum, increased menstrual flow and sometimes hæmorrhage from the bowels, and also a tendency to involvement of the lungs, with often fatal results. The October epidemic was much more formidable. Here, again, the outstanding feature was the frequency and severity of the pulmonary complications. In Bradford, for example, 184 of the 236 deaths were attributed to this cause. In one of the London Poor Law schools, out of 438 cases 250 had acute pneumonia; only two died. Not a few of the cases presented the appearances of an acute and rapidly fatal septicæmia.

In the clinical history of the disease there appears to be evidence of a gradually augmenting virulence of the infecting organism which of itself would seem to account in large measure for the severity of the pandemic in its later stages. Contributing circumstances were the accident of season, fuel restriction, the overcrowding due to shortage of houses and reduction of transport services, and generally perhaps the hardships, mental and physical, consequent on the war.

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The disease does not appear to have affected specially any class or section of the community. Rich and poor suffered alike. Inquiry in some towns shows that the epidemic not infrequently started in the well-to-do districts and only later involved the poorer and less prosperous areas.

It is impossible, unfortunately, to give figures as to case mortality for the country as a whole. I am indebted however to my former chief, Dr. Niven, for particulars of a sort of "block census" which he undertook in Manchester. The results have not yet been tabulated, but a preliminary analysis discloses some interesting facts as regards incidence, fatality and the immunity produced by previous attack. The method of inquiry was as follows: each health visitor selected five representative streets in her area: then taking a block of six houses in each street she filled in the desired particulars. Naturally data of this kind have to be accepted with a good deal of caution, and one may not be disposed to press conclusions based thereon too far, but I think they can be accepted as in the main correct. Dr. Niven informs me that he is continuing the inquiry. The results are briefly as follows: The inquiry covered 1,021 houses with a population of 4,721. Five hundred and three households, or almost exactly one half, were invaded in either one or other epidemic: the total number of cases was 1,108 or 25 per cent. of the population. 14·8 per cent. of the population were attacked in summer and 10·4 per cent. in winter. There is record, I think, of only one death among the summer cases, but fourteen deaths occurred in the autumn: of these fourteen only one had the disease in the summer. One of the most noteworthy facts elicited by inquiry into deaths from the disease is the small proportion of fatal cases which had suffered from previous attack. The autumn epidemic affected 266 households with a population of 1,358. Four hundred and ninety-one persons were attacked including eighty-two who had had the disease in the summer. One hundred and five households suffered in both epidemics. The history of these 105 households throws some light on the question of immunity. They comprised a population of 565 persons—of whom 205 suffered in summer and 360 escaped. In the autumn epidemic eighty-two (or 40 per cent.) of the presumably "protected" persons succumbed again, whereas only 120 (or 33 per cent.) of the "unprotected" suffered. Of the former, however, only one died, while five of the latter terminated fatally. These are interesting figures. If they are borne out by subsequent inquiry,

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they are somewhat difficult of explanation. The persistent susceptibility to the primary disease and yet comparative immunity from the fatal sequel, would seem to suggest a dual infection against one element of which the body is able to produce protection while it is unable to do so against the other.

A striking feature of this epidemic to which attention has been drawn by Dr. Stevenson of the Registrar-General's Office has been the age incidence of the deaths as compared with that of 1890 and succeeding years. Though no age escaped, the younger adults suffered particularly. Statistics show how the incidence shifted as the epidemic became more severe. This has been explained as due to an immunity (at any rate as regards the fatal issue) in the older generation who passed through the 1890 epidemic, though it is difficult to accept this view in the light of the general experience and of the figures which I have given above.

Turning now to the *specific cause* of the disease—opinion is still in a state of flux. There is little doubt as to the cause of the complications or sequelæ. These can obviously be produced by different bacteria of which the influenza bacillus, pneumococci and hæmolytic streptococci are the chief, acting on an organism whose resistance is weakened by a severe primary infection. The question still remaining to be answered is, what is the nature of this primary infection—is it the influenza bacillus of Pfeiffer, or is it some other as yet undiscovered organism? The almost uniform failure to isolate the Pfeiffer bacillus in the early and milder stages of the epidemic appears to be particularly significant. It was only later, when pulmonary complications became more frequent, that it was found in any considerable proportion of the cases. It is difficult to believe that these results were altogether due to the use of unsuitable media, or that they can be attributed to the "local multiplication of the bacilli in the trachea and bronchi without, at first, production of sufficient reactive secretion to dislodge them." Other organisms have been described by various workers—Gram-negative micrococci, Gram-positive diplococci, pleomorphic streptobacilli and others, whose claims to ætiological importance require careful scrutiny before they can be accepted. The same discordant results are reported from Germany, where efforts to isolate Pfeiffer's bacillus have been only partially successful. Some workers doubt whether investigation of the ordinary bacterial flora will yield any fruitful results. Following the lines of Foster's work on the "common cold," de la

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Rivière, Nicolle and Lebailly, and in our own Army, Gibson Bowman and Connor, claim to have transmitted the disease by injection into monkeys and human beings of the filtered bronchial secreton from patients suffering from influenza. Although attempts to confirm these findings by Nuzum, Keegan Rosenau and others have not been successful, it is probable that further work in this direction will throw valuable light on the whole problem.

Administrative Control of Influenza.—We shall consider now the most difficult question—the question of the control of the disease. It is evident from the preceding remarks that our knowledge of the ætiology and epidemiology of influenza is lamentably incomplete. Therefore, in making recommendations and in devising purposeful measures for the control of the disease, we must, for the present, supplement this knowledge from our experience of analogous infections and allow ourselves to be guided in the main by general principles.

I will summarize briefly the chief facts of which we must take cognizance. Most of them have been already referred to. (1) Influenza has a very short incubation period—rarely longer than forty-eight hours—a rapid onset, and is devoid of characteristic symptoms during the early and apparently most contagious period of the malady. (2) Though there is still doubt as to the exact nature of the virus, there is none as to its extraordinarily high infectivity. (3) Infection is carried from the sick to the healthy in the secretions from the respiratory surfaces. The experiments of Gordon and others, show that in coughing, sneezing and even in ordinary conversation, infected material may be projected through the air to considerable distances in the form of a fine spray. (4) That influenza is infectious only within fairly small distances is shown by the experience of institutions and hostels, where groups of friends who habitually dine together often remain free from attack, although they have meals in a room with infected persons. (5) There is still uncertainty as to the duration of infectivity, but some observations by Dr. Meredith Davies indicate that a patient is non-infectious one week after the temperature has become normal. (6) The question of immunity has already been referred to, but its importance is obvious from the point of view of prophylaxis. (7) The most noteworthy clinical feature in the recent epidemic has been the serious and often fatal character of the pulmonary complications. It is not yet clear whether these are truly complications or only symptoms

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of the primary disease in the production and aggravation of which other bacteria are symbiotically associated.

With these facts in the background of our mind we are now equipped—imperfectly it is true—to consider the various measures that have been advocated or adopted for the purpose of controlling the epidemic or of alleviating its severity, and to express an opinion as to the likelihood of their being efficacious or otherwise. First—with regard to *quarantine*. The possibility of preventing the importation of influenza into this country has been suggested but is not considered practicable by experienced sanitarians. In the United States the introduction of the disease was at first attributed to war conditions—the implication being that such introduction could have been avoided in peace time by a system of strict examination of all persons admitted, isolation of patients and suspected cases, and quarantine of contacts. More recent reports, however, admit that the idea is Utopian—and mainly on account of the large numbers of unrecognizable cases. It must be borne in mind that the disease was introduced into this country in a mild, unrecognizable form, some time about May, that dropping cases occurred during the summer, and that the autumn epidemic was for the most part a recrudescence of the disease already imported, though its severity may perhaps have been enhanced by the introduction from America of a more virulent strain of the influenza organism. This suggestion, however, is put forward with diffidence until more exact data are available.

The disease being with us, the next step was to learn of its whereabouts, and the numbers of the cases, and this raised the question of making epidemic influenza a *notifiable disease*. Apart from the statistical information it would have supplied, notification would have enabled zealous health authorities to ascertain the hardships occurring in the homes, and to focus attention on them. But except that towards the end of the epidemic one or two small districts applied to the Local Government Board for permission to add it to the list of notifiable diseases, practically no applications were received from any of the larger authorities. The main deterrent was probably the expense, and no doubt also the depletion of staffs made local authorities reluctant to adopt a measure which would necessarily involve much additional work without the sure promise of commensurate beneficial result.

Modified schemes of notification have been suggested. One

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proposal is that every doctor should be required to notify the first twenty or fifty cases occurring in his practice, but I doubt whether this would serve any useful purpose. A scheme that appeals to me is to make influenza notifiable in selected areas where there are facilities for intensive study—bacteriological and epidemiological—part of the expense being defrayed out of central research funds, as the matter is one of national concern.

Many medical officers of health, hoping to alleviate the severity of the epidemic, have concerned themselves with means of obtaining early knowledge of the severe cases, with a view to providing assistance in the form of nursing, home help or institutional treatment, e.g., in one district, with the Local Government Board's consent, "influenza complicated by pneumonia" was made a notifiable disease. In other places an arrangement was made with the doctors, who were asked voluntarily to notify to the medical officer of health cases requiring assistance, and at the same time to indicate what form the assistance could most usefully take: but such voluntary arrangements were for the most part unsatisfactory—doctors practising in the poorer areas, where presumably the hardship was greatest, being much too busy to undertake voluntarily any additional obligations. As a rule medical officers have had to rely for their information mainly on their health visitors and sanitary staff, and thus, no doubt, many necessitous cases were overlooked. As regards *communal prophylaxis* health authorities directed their attention for the most part, to educating the public and to measures calculated to lessen the opportunities for infection. Efforts were made to discourage or prevent the assembling of people in overcrowded and ill-ventilated buildings. Schools were closed. Children were excluded from cinemas and regulations were made to secure better ventilation, or at least periodical perflation, of these and other places of public entertainment, isolation was advised, and the use of masks recommended—but only hesitatingly. The larger authorities, and many of the smaller as well, undertook in varying degree home nursing, and institutional treatment: some supplied food, and even fuel and clothing, to necessitous cases—others opened crèches and invalid kitchens, and generally the history of the action taken compares favourably with that of any other country of which I have knowledge. Local organization in this country is not very showy: it does not lend itself readily to publicity; it is undoubtedly susceptible of great improvement: but judged by results it is often wonder-

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fully effective, and I speak advisedly after a considerable pre-war experience of the public medical work of our chief enemy, who favoured the more centralized form of administration. The importance of *isolation* as a measure of prophylaxis cannot be too strongly urged: and even if we must admit the impracticability of segregating every case, we should at least be very insistent on the isolation of severe cases, and particularly those with pulmonary complications: apart from the perhaps small effect it would have on the total incidence, it would almost certainly result in a considerable reduction of the severity of the disease. One of the most tragic features of the epidemic has been the heavy sickness rate and the high mortality amongst hospital and ambulance staffs: there is little doubt that much of this could have been avoided by due recognition of the extraordinary infectivity of influenza, of the need for strict isolation of the sick, either by screening or otherwise, and generally by insisting on the precautions ordinarily observed in dealing with acutely infectious diseases of the respiratory system. One of the most important of these precautions is the wearing of *face masks* by nurses and other attendants on the sick, i.e., several folds of gauze covering the nose and mouth, and so preventing inhalation of infected material from the patient. The face-mask is probably a very old institution. Readers of Stevenson's "Black Arrow" will recall how it was used to prevent the spread of infection by leprosy patients. It is possible that the eastern veil, which is now little more than a subtle instrument of feminine allurement, was originally designed partly as a protection against disease. In modern times, the mask is recognized as a necessary protection in dealing with cases of pneumonic plague, and several years ago Weaver introduced its use into the infectious disease wards of the Durand Hospital in Chicago with very satisfactory results; his example has been since followed in other American institutions, and lately by Professor Vincent in the Val de Grace Hospital in Paris: it is noteworthy that Professor Vincent, sharing the view long ago expressed by Dr. Bezley Thorne, that the influenza virus may gain access to the system through the conjunctiva, insists on his attendants covering the eyes as well as the nose and mouth.

It is difficult to say how far the use of face masks can be urged as a measure of general prophylaxis. We should certainly first require more reliable evidence as to its efficacy—and this could only be obtained under controlled conditions such as obtain in

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hospitals and similar institutions. Further, it would, I believe, be hopeless to attempt to enforce an ordinance of this kind—in the observance of which the personal factor counts for so much—unless we have with us an educated and intelligent acquiescence on the part of the public, and agreement amongst medical men themselves as to its protective value. It is a point on which I feel rather strongly, but nothing in my opinion is in the long run so likely to be detrimental to progress in preventive medicine as the panic promulgation of general measures which do not rest on a secure scientific basis, and have not the endorsement of selected local experience. The experience of San Francisco, where it was stated the use of the face mask had had such wonderful results, is interesting. As a matter of fact, San Francisco suffered quite as heavily as any of the other American cities. Extracts from the local newspapers show that there was great opposition to the order, and that there was also considerable difference of opinion amongst medical men as to the efficacy of the masks; probably the opposition of the public was based mainly on the inconvenience caused by wearing the masks, and also by the restriction which the use of them placed upon the customary seasonable entertainments of dancing, cinemas, and so on. As a result, the experience proves neither one thing nor the other; probably the only effect is to leave in the minds of the San Francisco public a prejudice against masks which it will be very difficult to overcome in the future. Prima facie the face mask should be a good thing; there is a sort of recollection in my mind that the man who first introduced the umbrella into England had the distinction of being stoned; if people have learned to use umbrellas against the rain, I don't see why, in course of time, they should not learn to use a face mask as protection against the infected spray from their neighbours' mouths. For the present, however, the custom lacks public sanction, but it is a measure which deserves more extended experimental trial. As regards the various efforts made to discourage the congregation of people in crowded and ill-ventilated places, and so to prevent the diffusion of the infection from the sick to the healthy, these must, of necessity, have lessened considerably the total volume of sickness. Everything done to delay the course of the epidemic, to stay, even partially, its advance is all to the good, and helps to reduce that dislocation of communal life which inevitably ensues when the outbreak is of short fulminant character. No doubt a

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good deal can be said on both sides as to the advisability, or otherwise, of closing schools, cinemas, &c., and therefore it is desirable to leave local authorities a considerable amount of discretionary latitude in the matter. Still I think that, in view mainly of the marked and fatal prevalence of the disease amongst school children, the balance of opinion is in favour of closure even in densely populated urban districts. There can be no question as to its advisability in rural and scattered urban and suburban communities. It has been urged that small purpose is served in closing cinemas, schools, and so on, so long as overcrowding continues on trains, buses, and trams. In New York schools and places of entertainment were not closed, because it was felt that logically they would have to close department stores, restaurants, and other places where people congregate in the course of business; but surely there is a difference. Some services must be carried on if the life of the nation is not to come to a standstill; attendance at school, on the other hand, is "a special fact in young lives which is for a time, at all events, not a necessity, as is the continuance of work." Nor can it be said that the community would suffer greatly by prohibition for a few weeks of dancing assemblies, political meetings, or attendance at places of entertainment. The loss incurred by the last-named could be met, if necessary, by insurance. Cinema proprietors might induce the local authority to pay a part of the premium, and so secure itself against arbitrary action. On the question of *disinfection*, there is not much to be said. Routine disinfection of rooms is hardly necessary even if it were practicable, but care should be taken to destroy the discharges from the mouth and nose, particularly in severe and pneumonic cases. Clothing and other articles soiled by such discharges should be washed or boiled. Gargling the throat and lavage of the nostrils with mild disinfectants has been generally recommended, and, no doubt, has a possible value for nurses and attendants on the sick. It has been widely advocated as a means of general prophylaxis—and prima facie there is a good deal in its favour if done systematically or immediately after special exposure—say on return home after conversation with an obviously infected person or from a crowded meeting. On the other hand, some objections have to be remembered. It has been suggested that the vitality of the nasal mucous membrane may be injured by such lavage and its natural resistance to invasion by microbes lowered. The attempt of Averill and his colleagues to arrest an epidemic by

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spraying the contacts with a 1 in 1,000 solution acro-flavine were sufficiently encouraging to justify further trials of this method under selected conditions.

Nursing Service and Domiciliary Assistance.—The great difficulty of the epidemic was to secure early and adequate professional treatment of the cases as they arose. Many doctors had been called to the colours, and consequently the burden thrown on those remaining in civil practice was very great. They were practically snowed under. In Sheffield and other places an attempt was made, with but indifferent success, to pool the surplus time of the medical men, and to dole out assistance to other hard-pressed practitioners as required. This pool was reinforced in most areas by liberation of the health authorities' own medical staff.

The shortage of nurses was felt even more. Some authorities eked out the supply by using each trained nurse as a nucleus round which a service of more or less trained voluntary helpers was gathered, but the towns were few where such helpers could be obtained in sufficient numbers—nearly all the suitable women being employed on the manufacture of munitions or engaged in one or other of the numerous war industries. Most local authorities were ultimately impelled to suspend temporarily their maternity and child welfare work, and to liberate their health visitors for domiciliary nursing. Local district nursing associations rendered invaluable service which was recognized in many cases by the grant of a substantial subsidy from municipal funds. In some of the larger towns much was done in the way of providing home assistance. Manchester is particularly noteworthy in this respect. All cases notified by a doctor, or coming to the knowledge of a health visitor, were carefully investigated, and note made as to the amount and kind of assistance required, e.g., attendance, coal, food, or otherwise, and where possible the need was supplied. Where the family income fell below a calculated standard, and the case was evidently necessitous, a grant of money was made to the health visitor for the purchase of food or other necessaries for the family. Demands of this kind do not cease abruptly. They are far-reaching. Many households have lost their bread winners as casualties in the epidemic, and the families have, of necessity, to fall back on the community for maintenance.

Crèches and kitchens were established in many districts, e.g., at Sunderland invalid kitchens were opened at several elementary

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schools from which volunteers took the food to afflicted families. In poorer houses bed clothes were often quite inadequate for the needs of the patients, and help was given in this direction in Birmingham and other places. As regards institutional treatment, the general hospitals and Poor Law infirmaries admitted many cases of pneumonia following influenza. In many instances the local authority supplemented this accommodation by throwing open one or more wards in the isolation hospital. Some medical officers of health were disposed to view this departure with distrust, but where the experiment was tried, it appears to have been uniformly successful. It must be borne in mind, however, that cases of influenza with pulmonary complications bear movement very badly, and that removal should be attempted only with the concurrence, and under the direct supervision of the medical practitioner in attendance. In hospital the patient should be isolated by screening or otherwise, and ambulance and nursing attendants should be most careful to use masks, and generally to observe all the precautions necessary in dealing with an acutely infectious disease. In some towns emergency hospitals were started in schools and halls and large unoccupied private houses, and reports indicate that the supply of nurses and doctors was considerably economized in this way.

It is too early yet to say what success has attended the use of *vaccines*. In this connection the settling of the question of the specificity or lack of it of Pfeiffer's bacillus is a matter of the greatest importance. Various vaccines have been tried—a polyvalent vaccine consisting of killed cultures of the Pfeiffer's bacillus, pneumococci, and streptococci, and a monovalent vaccine, consisting of Pfeiffer's bacillus alone. The object aimed at was, if possible, to increase the resistance to the primary infection, but chiefly also to provide protection against the very fatal sequelæ. The military forces offered an excellent field for the trial of these vaccines under controlled conditions which were unattainable in civil life, and we all await with interest the publication of the results obtained.

But even by the War Office Committee the use of the vaccine was not urged with great assurance, and rightly for two obvious reasons, viz., the doubt that still exists as to the microbic cause of the disease and the impression which generally prevailed that one attack does not seem to afford any marked protection against a subsequent attack. A certain amount of polyvalent vaccine was

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placed by the Government at the disposal of local authorities, but only a small proportion was applied for, and chiefly on behalf of hospitals and other institutions where the staff were specially exposed.

Education.—Practically all health authorities endeavoured to inform the public by means of leaflets, posters, notices in the Press, lectures in the schools, exhibition of cinema films, and so on, as to the nature and gravity of the malady, how to prevent infection, and the precautions to be observed in case of attack. Most of the advice followed the usual lines. Briefly it resolved itself into this, "maintain the general health, and avoid infection."

I have endeavoured in this paper to give you a general account—I am afraid very inadequate and admittedly incomplete—of the recent epidemic from the point of view of the practical sanitarian. Briefly the conclusion seems to be that with our present knowledge we can do little to control the spread of epidemic influenza; the best we can hope for is to mitigate its severity. We cannot kill the disease, but we can draw its teeth.

One or two lessons of general interest seem to be worth noting. First, it is obviously idle for any permanent health staff unaided to attempt to cope with an epidemic of the dimensions of that through which we have just passed. A pandemic is in its suddenness like a gas attack, and must be countered in a somewhat similar way by making each individual citizen responsible for a share of the defence. The permanent staff can only serve as a nucleus round which shall be rallied a voluntary service of persons trained in first aid, home nursing, and other duties, who are enlisted from the general public and pledged to give their assistance in time of emergency. What we want to attain in public health administration is a proper balance between the function of the permanent expert staff and that of the individual citizen, and more cordial and intelligent co-operation between the two.

And this leads me to the second point—the need for greater diffusion of knowledge of preventive medicine amongst the public, and particularly amongst the youth of the country—not a course of training in the minutiæ of sanitation, but enough to enable him to assess at their proper or approximate value the various panaceas which will solicit his consideration in later life—enough to give him a sense of proportion in matters of health. Our newspapers have had for long a city page dealing with matters financial. Why not

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have a health page or column under responsible editorship. I do not mean replies to queries, but well-balanced and well-considered accounts of recent advances in preventive medicine. To the average man it is probably of as much, or, perhaps, more, importance to learn how to keep well than to know the price of Mexican Eagles or of Peruvian Corporation Preference.

Lastly, though this should have come first, there is the need for research, to the claims of which and of the research worker we in this country have been for too long hopelessly indifferent, but it does seem as if at last both are to come into their own. It may be timely, however, to sound a note of warning. The search after truth is toilsome, and the way is long. The popular way at present is to point to the wonderful things that have been achieved in the Army, and the deduction is made that by the application of similar methods in civil life sickness will be eradicated from the community in a couple of decades, and pandemic and epidemic diseases will be a thing of the past. Promises of that kind are idle and mischievous, and likely to do more harm than good to the cause for which we are all working.

NOTICE.

THE Secretary would be glad to receive copies of THE JOURNAL OF STATE MEDICINE for January, 1919, from Fellows and Members who may have no further use for them.

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Chemical Notes.

BY

ALAN W. STEWART, D.Sc., F.C.S.

Demonstrator of Chemistry at The Royal Institute of Public Health.

Estimation of Sulphur in Vulcanized Rubber (H. P. Stevens, *Analyst*, 43, p. 377).—About 0·5 grm. of the sample is digested in a Kjeldahl flask with 20 c.c. of strong nitric acid, to which about 0·5 grm. of potassium chlorate is added. If the sample is finely divided the initial reaction is violent and the flask should be cooled in water. Afterwards it is fitted with a small condenser and the liquid boiled for two to three hours, then evaporated to dryness in a porcelain dish with 3 grm. of magnesium nitrate. It is necessary to moderate the heat at the last stages to avoid decrepitation. It is finally heated cautiously over a naked flame. If an appreciable amount of carbon remains unburnt, it is best destroyed by digestion with nitric acid, plus a little chlorate and the excess of acid is evaporated. Ten c.c. of conc. HCl are then added and the dish is covered with a watch glass, and gently heated for one to two hours until red fumes cease to be produced. The liquid is diluted, filtered, made up to 300 c.c., heating to boiling and precipitated by adding 5 c.c. of 10 per cent. barium chloride. The sulphate is then estimated in the usual way.

The Examination of Saccharin Tablets (H. D. Richmond, S. Royce, and C. A. Hill, *Analyst*, 43, p. 402).—(1) *Average weight*: Weigh 20 tablets and divide total weight by 20. Calculate into grains per tablet. (2) *Alkalinity*: Dissolve a tablet in 25 c.c. of water at a temperature of about 80° C. Add 10 c.c. or more of $\frac{N}{10}$ acid, boil off the CO_2, and titrate excess back with $\frac{N}{10}$ NaOH to phenolphthalein. The average number of c.c. of decinormal acid used for a tablet $= x$ (see next estimation). (3) *Saccharin*: The twenty tablets previously weighed are placed in a Kjeldahl flask; 25 c.c. + x c.c. of 4 N. hydrochloric acid (approximately 45 c.c. conc. HCl made up with water to 100 c.c.) plus sufficient water to make 50 c.c. are added. The flask is boiled under a reflux condenser for 1½ hours; add 20 c.c. of 30 per cent. NaOH, together with a little powdered pumice and about 0·5 grm. of paraffin wax. The ammonia is distilled into 20 c.c. of $\frac{N}{5}$ acid, and the excess is titrated back with $\frac{N}{10}$ alkali to methyl red. Saccharin tablets always contain some sodium bicarbonate; this converts the insoluble saccharin into the soluble sodium salt. Controlled saccharin is either full strength, containing 0·3 grain in a one-grain tablet or half strength containing 0·15 grain in a half- or two-grain tablet. After allowing 5 per cent. either way for error in manufacture and a further 2 per cent. for mechanical loss, the author considers that full strength tablets should contain from 0·265 to 0·315 grain of ortho-benzoyl-sulphonimide. The prices at present for the half and full strength British tablets are respectively 1s. and 1s. 7½d. per 100.

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Reviews.

Medicinal Herbs and Poisonous Plants. By David Ellis, D.Sc., Ph.D. London, 1918: Blackie and Son. Pp. 179. Price 2s. 6d.

In the course of his work at the Royal Technical College, Glasgow, the author meets many people interested in botany as a recreation and change from their studies, and he observed that their interest grew if the plants in question were either poisonous or possessed medicinal properties. The author has, therefore, compiled a very useful and practical handbook on these herbs and plants; their salient features, cultivation, source of supply, &c., are well described, and some details are given bearing on the commercial aspect. The various herbs which are imported or collected for herbalists have been included amongst the medicinal plants; the author states that many of them are of doubtful therapeutic value. The scope of the present work does not include those medicinal or poisonous plants of the cryptograms. There are many good diagrams throughout the text, and altogether this is an excellent little botanical manual, giving much information on the subject. Amateurs will find it very useful in particular.

Rats and Mice as Enemies of Mankind. By M. A. C. Hinton. London, 1918: The British Museum (Natural History), Cromwell Road, S.W. 7. Pp. 63. Price 1s.

During these present times when the saving and safeguarding of essential food-supplies is imperative, one is apt to overlook the damage which rats and mice do and the extent of it is not sufficiently realized by the majority of people. They have also been proved to be the agents of disseminating some of the most serious diseases, such as plague, for instance. Mr. Hinton, in his excellent little manual, shows how urgent is the necessity of organized action to reduce the numbers of these small mammals, which may truly be described as the enemies of mankind. This is No. 8 of the very useful and practical economic series issued by order of the Trustees of the British Museum. The features distinguishing the black from the brown rat and those of the common mouse are clearly and concisely given together with much useful information as to general habits, breeding, prevention, and extermination. This pamphlet should be widely read, and its advice, if acted upon, will materially benefit many classes of the community, and certainly diminish the risk of such diseases which in part depend upon rats and mice for their propagation.

Coal and its Scientific Uses. By Professor William A. Bone, D.Sc., Ph.D., F.R.S. London, 1918: Longmans, Green and Co. Pp. 491. Price 21s.

This book is a valuable addition from the national point of view, to the interesting series of monographs on industrial chemistry and much credit is due to the editor and publishers for their energy and zeal. The publication of the work is opportune at the present time when the problem of fuel economy has been seriously brought to the notice of the general public. The author has succeeded in giving the scientific public and especially the chemical section of it a clear and concise account of the statistical aspects of the subject, without unnecessary detail nor excess of mechanical illustrations. The book begins with a chapter on the general and statistical aspects of the Coal Question from a national standpoint; a good review of the present state of science regarding the origin and chemistry of coal follows, together with much useful information on its distillation, oxidation and combustion. The later chapters deal with the principal economic and industrial uses of coal as a fuel; the volume closes with an account of "Surface Combustion." The author indicates the directions in which reforms are needed, in a clear and interesting manner and the economic lines upon which the full utilization of the calorific value of coal can be achieved. Readers will be surprised to learn that in the writer's estimate the total weight

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of soot and smoke produced in factory chimneys throughout the kingdom is approximately six million tons annually, and from domestic sources about one half of this figure. To the non-specialists the chief interest will be found in Professor Bone's explanation of the ways in which we may rid ourselves of the smoke evil and yet economize the natural resources of the country. A protest must be made against the index which is certainly inadequate for a book so full of detail. The author's work should be widely read and studied and is an expert treatise on a subject full of future possibilities and researches.

THE ROYAL INSTITUTE OF PUBLIC HEALTH.

THE LONDON CONFERENCE.

WEDNESDAY, JUNE 25, TO SATURDAY, JUNE 28.

THE Inaugural Meeting, under the Presidency of the Right Hon. the LORD MAYOR, will take place in the Mansion House on Wednesday, June 25, at 3 p.m.

On the following days, June 26, 27, and 28, at the Guildhall, Problems of Reconstruction in Relation to Public Health will be dealt with:—

(*a*) "Housing in Relation to National Health."
Chairman: Sir ASTON WEBB, K.C.V.O., C.B., President of the Royal Academy.

(*b*) "Maternity and Child Welfare."
Chairman: Mrs. LLOYD GEORGE.

(*c*) "The Tuberculosis Problem under After-War Conditions."
Chairman: Professor Sir WILLIAM OSLER, Bart., M.D., D.C.L., LL.D., F.R.S.

(*d*) "The Prevention and Arrest of Venereal Disease."
Chairman: The Right Hon. LORD SYDENHAM OF COMBE, G.C.M.G., G.C.S.I., G.B.E., F.R.S.

(*e*) "The Work of the Ministry of Health."
Chairman: Colonel WILLIAM R. SMITH, M.D., D.Sc., LL.D., F.R.S.Ed., Sheriff of London.

Fellows, Members and Associates of The Royal Institute of Public Health intending to be present should at once inform the Honorary Secretaries of their intention, when a Conference ticket will be forwarded to them free of charge.

All communications to be addressed to the Honorary Secretaries, 37, Russell Square, London, W.C. 1.

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THE FUTURE OF THE TUBERCULOSIS PROBLEM.

BY

P. C. VARRIER-JONES, M.A.(Cantab.), M.R.C.S., L.R.C.P.

Hon. Resident Medical Superintendent, Cambridgeshire Tuberculosis Colony.

A Lecture delivered at The Royal Institute of Public Health.

It is not my intention, even if it were in my power, to pass in review all the possible solutions of the tuberculosis problem—the future of which covers a field so vast, a world so full of promise, so crowded with difficulties, so surrounded by fears and prejudices, that in one brief hour the subject could be skimmed over merely with the lightest possible touch. With your permission, therefore, I will attempt to deal with a part of the problem only, a part in my eyes perhaps assuming undue proportions and importance, but a stone which if built into the building we are all striving to erect may assist in strengthening the structure and help to make the work of others easier and its completion somewhat nearer of attainment. I was once told in this room that the work I am about to describe was my little corner, and one must confess that residing in a little corner one is apt to be unduly absorbed in the study of the contents of that corner, and perhaps to overlook the larger world outside. Be that as it may, the corner method teaches one the reality of things, brings one into very close contact with the vital principles and renders a superficial view of the situation, and therefore, a superficial judgment less probable. A broad view of the whole of our problem is essential, but I confess that I am strongly of opinion that no solution can be found by taking a broad view and that alone, for it must never be forgotten that at bottom the problem is one of the individual. We are not dealing with a flock of sheep or a herd of cattle. We are dealing, of course, with a mass of humanity, but a mass made up of definite entities, each unit resembling the other in many characteristics, but each differing from the other in a thousand ways. While it is true that one consumptive resembles another, in the extent of the lesion in the lung, it is equally true that wide differences of temperament, character, social position, not to mention varying degrees of resistance to the disease, exist and have always to be taken into

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consideration. We often hear, and indeed are almost sick of hearing, that 60,000 persons die annually from tuberculosis, the problem being presented to us as one of mathematics to be solved as an arithmetical problem. We hear that such and such a figure represents the total incidence of the disease, and that so many beds in so many institutions must be provided to combat the scourge, and it ends there, or rather it begins there, for we immediately reduce the figures to £ s. d. and say that so many beds will cost so many pounds and, low be it spoken, we feel proud of our wonderful powers of calculation. It is true, of course, that the problem has its financial side, and a very important side it is, but it cannot be insisted too strongly that the question at issue is of greater complexity than is involved in this financial side, and unless this is recognized all our calculation is work in vain. All of us are aware of the extent of the problem. We all recognize the economic loss to the community through tuberculosis disability, and we all appreciate the fact that there is one, and but one, solution to this problem. The question is, how is that solution to be arrived at, in other words, how can we prevent the spread of infection without which there can be no further extension of the disease? It is unfortunately necessary at this stage to clear the ground somewhat, for there still exists at the back of the minds of some a doubt as to the infectiousness of the disease with which we are dealing. We here, no doubt, are firm believers in the infectivity of tuberculosis—that it is contagious, that the spread of human tuberculosis (i.e., infection with the human bacillus)[1] is by direct, or in some cases indirect means from one human being to the other. We give this hypothesis our lip service, we should consider it a slight on our common sense were we told that we did not believe it; we have gone so far nowadays as to be impatient of a repetition of the statement, yet if we examine the matter closely and in all its bearings, we realize that it has our lip service only. Our actions do not correspond with our words. We have certainly honoured the statement, but in the breach rather than in the observance. How often do we hear that the chief rôle of sanatoria is that of education, that the patients who are discharged after a short stay have been instructed in the way of life and know how to live a life perfect in hygiene and adapted for the prolongation of working-

[1] The bovine bacillus being responsible for a very small proportion of pulmonary tuberculosis, probably not more than one per cent. Cobbett.

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days. But what opportunity have they to put the precepts into practice? Are not veritable sources of infection every day sent broadcast over the land? What steps are taken to prevent the spread of infection when we allow these unfortunates to wander at will? No doubt we keep the spark of life alight by small doles of money or food, we find underpaid jobs for them, we allow them to be exploited in the labour market and we give all these endeavours a name of high sounding quality and call it "After-care." What a cheeseparing policy it is—this doling out of small sums of money and food without very accurate supervision as to how it is spent and how far it will be of real help. We all know how rapidly a consumptive who has had treatment at a sanatorium descends the social scale. Employment becomes less remunerative and less secure, until only the most casual labour is open to him.

The interval between treatment in an institution and the case becoming "advanced" is often very considerable—we now have accurate data as to the length of time occupied in this gradual descent—and it is throughout this time that nothing, absolutely nothing, adequate is done to prevent infection. We have truly given lip service only, but our actions do not conform to our faith. Of course, I shall be told that I have forgotten our important service of health visitors and sanitary officials who are daily making strenuous efforts to prevent the spread of infection and with much labour are paying daily visits to the homes of these people and instructing them in the way they should go. I agree, but they are engaged on a superhuman task; the patient's life is so varied, the circumstances so changeable that it is impossible to secure an amount of supervision that can have any appreciable effect upon the spread of infection. Quite recently I received a letter from a tuberculosis officer pointing out the desirability of dispensary supervision and the improvement in medical treatment following the visitation of patients in their own homes. On making inquiries as to how many of the patients were at work I could obtain no definite answer, but so far as I could gather many were working but under conditions which were not stated. The number of cases was very considerable, more and more were always pouring in and no evidence was adduced that the prevention of infection was the primary object aimed at, simply the treatment of the individual; again our profession of faith did not stand the test of action. A health visitor with all the goodwill in the world cannot be in more

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than one place at once even in the Lord Dundreary sense. The middle case coughing often—whether at work or in the home or in places of amusement—is an ever present source of danger and unless sufficiently isolated, must be a centre from which dissemination of the disease takes place. The treatment, a term as elastic as it is vague, for in its true sense it can have no meaning when it refers to a consumptive patient in bad surroundings—is of no avail in preventing the spread of infection. We know that treatment of a consumptive to be of any influence in arresting the disease—not merely in the alleviation of symptoms—must be carried out under very special conditions. The temporary improvement, the mere transient betterment of his general condition is but a phase, a passing phase of the journey along the gradual downward path he follows. There is no satisfaction in such a fleeting momentary improvement, either from the patient's point of view or that of the general community. He is no better able to work, the least strain aggravates his morbid condition, and he soon becomes quite unsuited to the environment in which he finds himself. Our treatment, in other words, has not materially benefited the individual but it has cost the community much in money, work, thought and anxiety, and has sown or allowed of the sowing of the seeds of more care, worry, anxiety and expense for succeeding generations. If it were our object to perpetuate the disease, there could surely be no more certain method than the one we now adopt. We have either adopted a faith blindly, or we do not accept a faith we profess. To say that it is difficult to convert our faith into works, is to beg the question. That it is difficult should not make us shut our eyes and go gaily on in the opposite direction.

Our half-hearted action may of course arise from lack of conviction that the disease is infectious; what is the evidence?

Newsholme remarks that "having investigated nearly 1,600 voluntarily notified cases of phthisis, as well as a much larger number of fatal cases of phthisis, from a public health standpoint, I do not conceive it to be possible that any physician having done similar work could fail to realize to the full extent the infectivity of this disease, when exposure to infection is protracted, and the dosage of infection is great; a state of matters which is the domestic lot of most of the working classes, when tubercular infection attacks a member of the household. The evidence convincing one of this does not lend itself to statistical

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statement, and when stated in print it may not be convincing; but the steady succession of cases in infected households at intervals of one or two years, or longer, the intercurrent destruction of children by tubercular meningitis or "broncho-pneumonia" while their parents are suffering from chronic phthisis, and other similar evidence, can leave no doubts in the minds of those who come into continuous contact with the actual facts." (*Trans. Epidemiol. Soc.*, xxv., p. 70).

Or again, it may be the knowledge that the task to which we have put our hand is indeed impossible of attainment. In other words we accept it as quite impossible to control the sources of infection, believing that these sources are so numerous and unknown, that no method of segregation could be devised to include not all, but even an effective proportion of them. Is it a fact, for example, that just as there are carriers of the germ of diphtheria, so there are carriers of the tubercle bacillus, who go through life without any symptoms which might at any time attract attention, and yet are the means of handing on the disease to several, nay, many persons. I might illustrate the point by a concrete example. A Cambridge undergraduate—a fine athletic man—developed what was diagnosed as an attack of influenza. Its course was prolonged and there was cough and expectoration. The sputum was repeatedly examined with negative results. The patient recovered completely. Some months afterwards he suddenly coughed up a mass of sputum and being of a curious turn of mind brought it to the pathological laboratory with a request that it should be examined. Under the microscope the specimen was almost a pure culture of tubercle bacilli, so numerous were the rod-shaped organisms. The patient was apparently in the best of health. It may be argued that such a case would be very difficult to discern, very difficult to isolate and it may well be that, amongst the well-to-do, those who live under the best conditions, the disease is spread by such an individual as I have just described. That insanitary houses, want of food, lack of the necessaries of life are not the only predisposing causes of tuberculosis seems clear, for tuberculosis takes its toll from the rich as well as from the poor, from the athletic as well as from the poorly developed. This leads me to another point. It is often argued that tuberculosis is the great means adopted by nature of weeding out the unfit. Such a statement is grossly inaccurate, it has done incalculable harm in preventing our legislators and the

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public at large from seeking the adoption of right methods of dealing with the problem. As long as the mass of public opinion is influenced by such an argument, so long will there be an insuperable barrier in the way of any efforts at reform. When it is argued in cold blood that it is against public policy to encourage the existence of the tuberculous, that such persons must invariably be weeds, and therefore unfit to exist, it is useless to try and persuade the mass of mankind to adopt measures for the prevention of infection or the proper treatment of the unfortunate individual. Tuberculosis never has been and never will be the means of improving the race—no disease has ever helped to such an end, and no disease ever will. It is the victim of tuberculosis, when that disease has worked its will, and not until then, who is the unfit. He has been made unfit by the disease, he was not unfit before he was attacked.

Recently making a careful examination of the histories of all the patients admitted to the Colony, it came as a surprise to me to find how high was the percentage of men who had led an athletic life before they were attacked by the disease. Many belonged to the local football or cricket club, others were men who excelled in other forms of athletics—were strong swimmers and fleet of foot. It was almost an exception to find a patient who had not been good at some form of exercise, while many were conspicuous for the skill they had once displayed either on the football field or in some other strenuous pursuit.

Looking back at the friends of one's own undergraduate days one is struck by the news of the illness, or even, in some cases, of the death from tuberculosis, of those whose physique was universally admired and whose prowess in athletics was specially commented upon; I feel convinced that a similar investigation in other institutions for the tuberculous would bring out the fact that it is not the "weeds" who are specially attacked by the disease—at any rate not those whose physique is not able to pass the standard of the Recruiting Medical Boards. Again, amongst soldiers discharged from the Army suffering from pulmonary tuberculosis, it is the exception to find that those who are admitted for treatment are those who were placed by the Recruiting Medical Boards in Grade III. That the meshes of the sieve were large enough in the early days of recruiting cannot be denied and that many men who obviously had tuberculosis were passed as fit, but after the first

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rush was over, and when adequate arrangements had been made for the examination of men by the tuberculosis officer, the number of cases of pulmonary tuberculosis passed into the Army was small. Upon investigation it is clear that the men who are now invalided out of the Army on account of tuberculosis are those whose physique was particularly good and whose general condition gave no easy or obvious clue to the presence of a lesion of a tuberculous nature in the lung. Would it not be well that this investigation should be prosecuted in other localities? Were this done I have little doubt that my Cambridgeshire results would be confirmed. From a physical point of view there does not appear to be any ground for the suggestion often advanced that those who contract tuberculosis are necessarily weeds—that the weeds are *also* attacked "goes without saying," but it does afford evidence that the disease is no respecter of persons, that it exercises no selective principle and that weak and strong alike fall a prey to its ravages. If it be our object to perpetuate a race of physically strong individuals, if that be the great aim of selection, then it is useless to encourage a disease which is non-selective, i.e., attacks the well-developed muscular man as it does the weak, nay even in greater proportion.

If on the other hand it be our aim to produce a race of intellectuals, whose mental capacity may overshadow the development of mere muscular strength, we are equally perverse in singling out tuberculosis as the agent with which to attain this desirable end. We know that those who have an exceptionally well-developed brain, those endowed with mental capacity far above the average, fall a prey to the disease in no fewer numbers than do those not so endowed. We have merely to call to mind such names as John Addington Symonds, John Richard Green, Shelley, Keats, Chopin, Mozart, Robert Louis Stevenson, Washington Irving, Jane Austin, Charlotte Brontë and her sister Emily, amongst a host of others, to convince ourselves that if the brainless ones are often attacked by the tubercle bacillus, those to whom genius has been attributed are attacked in equal, if not in greater, proportion. Look at the question how we will, we are forced to the conclusion that the tubercle bacillus is no respecter of persons, the strong and the weak alike are attacked; there is no question of any special susceptibility of the feeble and the weeding out of such in order that the race may be improved. The error so widely promulgated has done incalculable harm. It has encouraged the pragmatical in

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high places to meet the proposal for the prevention and treatment of the disease by the argument that no good can come by prolonging the existence of the weak and that to root out the disease is to deprive Nature of her best means of improving the race. This argument must be met and countered with the fullest determination. It is absolutely groundless and is pervaded by no single ray of truth. Once the ground is cleared and it is recognized (1) that tuberculosis is an infectious disease, and that we must act up to the faith that is in us, and (2) that there is no evidence that the disease selects as its victims only the nation's weeds and thus improves the race, then the method of attack becomes clear.

The crux of the question is the problem of the middle case. First, the spread of infection must be limited and in order to do this it is necessary that our energies should be concentrated not so completely on the symptoms of the diseased, those who have well defined symptoms and signs, in whom the lung tissue has broken down and by whom the bacilli are freely expectorated, in futile attempts to "cure"; rather must we devise and press forward a comprehensive scheme whereby the individual for whom we are arranging to care shall be placed in a position in which he may have the advantages of treatment to arrest the disease, whilst at the same time he shall be rendered inert as an infective centre to the community, which is thus afforded protection against further ravages. When we as a community realize that the segregation of consumptives during treatment can be made a practical proposition, we shall have advanced a long way towards the elimination of infection. The question of the detection and treatment of early cases of tuberculosis involves other and very important issues, but until our medical schools are reformed and the early signs (I refer to the true early signs, not those now commonly accepted as such) recognized and passed on to those who in the future will be engaged in general practice, are we not merely beating the wind and losing valuable time? The advice to treat early cases is excellent, but until the mass of medical knowledge accumulated is sufficient to ensure early diagnosis little progress along these lines can be made, though all efforts to attain it should be encouraged, not, however, as is frequently urged, as the only means of bringing about the millennium.

The greatest difficulty met with in carrying out after-care of "middle" cases is the provision of suitable employment and

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occupation for them. We have tried and we continue to try to fit square pegs into round holes; the misfit is oftentimes ludicrous. For exceptionally carefully selected "early" cases, such an after-care scheme as that worked in Cambridgeshire undoubtedly meets with unqualified success. But the moment we tackle the "middle case" on these lines lack of success attends our efforts. We are indeed attempting to grow orchids in entirely unsuitable conditions and environment. The keen wind of competition quickly shrivels up the leaves and stunts their growth. It is obvious from the very nature of the case that we cannot succeed. Any frequently recurring breakdown, any lack of sustained energy, any want of power and physical force must unfit the worker to "carry on" under the ordinary work-a-day conditions in which the normal person works. No one realizes this more fully than does the consumptive. Why, then, does he try to exist under such conditions? Simply because there are no others under which at present he can exist. No practical proposition has been placed before him. Even institutions which employ consumptive labour, always pick the best cases and even then maintain that such cases are but broken reeds. Very few, if any, sanatoria deliberately select middle cases and offer them jobs. Yet these are the very cases which are in greater need of assistance than any others. Even sanatoriums, which it is to be assumed are institutions run on business lines, cannot afford to employ these people, for they can never earn a living wage. To maintain them in moderate health, the equivalent of a living wage they must have, although they cannot be employed when a profit and loss sheet has to be drawn up and balanced. We cannot expect them to be a paying proposition. I have always maintained and believe that I have been justified in maintaining that the labour of a middle case of consumption must be subsidized and that many of our failures in the past have been due to the fact that, consciously or unconsciously, we have always taken the consumptive at his face value. We have been too much influenced by appearances and feel that he ought to do more work than can really be expected of him. We have only to glance at a group of consumptives to feel almost convinced, unless we are "on guard," that they are a group of slackers. They appear so fit. Yet on applying the stethoscope our opinion is—or ought to be—instantly modified. Patients suffering from epilepsy are utterly incapable of earning a living under present economic conditions; a

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consumptive with moderate disease is in exactly the same position. We must bring our mind to realize this. When we have also educated the consumptive to realize this, we shall soon recognize that both from the individual point of view and from that of the community, *we must call into existence a set of conditions suitable to the patient's needs.* Such conditions are to be found in a colony. We must realize, difficult though that may be, that the medicine of yesterday has been satisfied with the treatment of symptoms, with the relief of individual suffering. Our hospitals have been filled with advanced cases of heart disease, kidney disease, and other fibrotic processes, and we have been content to describe such conditions and treat them. The question of prevention has scarcely been considered, even now are we not always trying to close the stable door after the horse has been stolen? In tuberculosis, at any rate, is it not time we started at the right end, to give up trying to heal symptoms, to catch up in a losing race? A sanatorium should not be a separate entity, a watertight compartment in which early cases only are received and treated—the early cases—cases without any sign of a breakdown of lung tissue which can be treated with the excellent results of which we all have experience. Sanatoria should be set apart for the arrest of definite symptoms and hold *their place in colonies* as rest houses or fever houses, while the colony as a whole should be designed for the reception and segregation of such cases where they may exist, work, and live comfortably, without being sources of infection to the general community. We have already used sanatoria for early cases, and now in some quarters it is proposed to start colonies where a further strict selection shall take place and the best of early cases be treated for a further period. Excellent for the individual no doubt, but what a small contribution to the solution of the main problem. Surely with the lack of adequate results from sanatorium treatment before us, we are not going to extend and perpetuate the system, keeping the current in one narrow channel, one narrow groove. Colonies to be successful in meeting present needs must be much more comprehensive than this, they must include the sanatorium or rest house, they must extend the activities of sanatoria both downwards and upwards, receiving advanced cases that will not consent to enter a home for the dying but will grasp at the last straw of hope such as can be held out at a sanatorium, and on the other hand offering opportunity for

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healthful work and healthful surroundings to those who, while less unfortunate, still cannot compete with the fit man in the world at large. Early cases receive treatment and training and with the added inducement of remunerative work may be kept under prolonged treatment and be fitted to return to the world with the disease arrested. But the whole system must be linked together into a concrete whole. The usual conception of a colony is a place where tuberculous cases can be sent to work for a wage which is little more than pocket money, but where there is no room for cases that present any physical signs of disease. It seems to be accepted that as soon as the latter cases are admitted the whole colony must be upset, since it cannot cater for those who require a few days rest in bed. Indeed so limited becomes the selection, due to the rigid medical examination, that few cases can be submitted to this special building-up process, and when to this is added the enormous difficulty of persuading a man to undergo training while a wife and family live on the bare necessities at home, we see that if this conception be accepted the scheme must be of very limited scope, more limited even than that of the sanatorium. When further we consider that no practical man can be gulled by the myth that he can be trained as a practical farmer or small holder in the space of a few months, and that even twelve months is not sufficient, we begin to appreciate the reason that so few men will consent to undergo the ordeal. We know and they know that a poorly trained man stands no possible chance of earning a living wage in the open labour market, and a poorly trained consumptive even less, and it is obviously far better for such an early case (I am speaking of the tubercle-free patient, devoid of physical signs—the usual candidates for such a colony) to be so financed by an after-care association on the Cambridge principle that he may continue to work at his own or some allied trade. As yet he is not a danger to the community, when he does become so, if under dispensary supervision he can be persuaded again to enter an institution. When we come to deal with cases of the next category the story is a very different one. The man has active disease, albeit somewhat retarded by treatment at a sanatorium. He is refused admission to such a colony as that just described, he cannot without serious danger return to his original trade, he cannot be suitably helped from outside by an after-care association, as his relapse is certain, and because of the extreme difficulty of finding

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suitable employment for him. These are the cases which unfortunately are now assisted with small doles of money and food and an underpaid job. The patient is kept continually on the edge of a precipice, the assistance he receives being just enough, but only just enough, to keep him out of the workhouse infirmary. Better far that such assistance should cease and the patient become an inmate of an institution. To this he will not consent, for he can still do a little work and he feels that as yet he is probably far from death. The man receives but palliative treatment and the community no real protection against infection. The pity of it is that we do not realize that under favourable and well-defined conditions the patient is capable of doing work of some real value. He can still work at his own pace, though unfortunately, as his own pace is far slower than that of his competitors in the work-a-day world, he soon finds himself in a backwater. Such a case should indeed excite our sympathy. We may see such a one six days out of seven, a man who cannot find his place in the world, and who left to his own devices disseminates the disease to his family or neighbours and fellow-members of the community. His full working capacity is over, the treatment of his case will never add glory to our sanatorium returns. His frail body excites the sympathy of the onlooker, no doubt, but he is the consumptive for whom no helping hand is forthcoming, the man who without that helping hand must fall from plane to plane of the descending social scale. He is the central factor in the problem of tuberculosis, a far more important factor than the advanced case — the bedridden case, where, although the danger of direct and concentrated infection is greater, it is so circumscribed that it is limited to a small family circle. The attack must in future be directed against this middle case; an attack bristling with difficulties, but offering great possibilities. The numbers of these middle cases are so enormous, our preconceived ideas of treatment so limited, our outlook so restricted, our conceptions of the capacity for work of these unfortunates so imperfect and even erroneous, that it is difficult to decide how to plan an attack at once humane and sympathetic, practical and effective. One thing is certain, our old methods are "sadly to seek." A short stay in an institution is played out. The improvement resulting from a carefully regulated life, but followed by relapse on return to unsatisfactory home conditions, throws into strong relief the inefficiency of the system. The short period

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of education available has been found to be useless, for the patient cannot put our precepts into practice.

In the past we have been content to limit our endeavours to the favourable case, and to leave untouched—untouched as far as effective treatment and the prevention of infection are concerned—the middle case. The reason for this is not far to seek, we have been blinded by the transitory results of sanatorium treatment, and have shut our eyes to the wreckage which such treatment has left in its trail. Very naturally we have no liking for disappointing results. The individual case, which, instead of improving goes steadily downhill, is, it must be confessed, a disheartening proposition if we focus our attention on the treatment of the individual. It is obvious that our attention should not be so focused, but that we should survey the whole field in order that we may make up our minds that it is necessary in the name of humanity and to protect ourselves, to care for these cases. Once we view the problem from this standpoint, and we grasp the essential fact that the disease is spread by the middle case, we cannot escape the logical conclusion that such cases demand our care and attention, and at once. Admitting all this, the fear still possesses us that so gigantic a problem requires almost superhuman effort for its solution. Sir Arthur Newsholme holds that by the admission of advanced cases from amongst the poorer classes into the wards of certain infirmaries, the spread of the disease has to a certain extent been lessened. Surely this points the way to the next step—the segregation of these middle cases in colonies where, with the best chance possible of recovery, they also cease to be a source of infection to others. If by the voluntary segregation of advanced cases a perceptible improvement has been made, is it not logical to assume that we may expect still greater improvement when some method of segregation is found for the middle cases, those who find themselves stranded and unfitted for the struggle of existence in the world as at present constituted.

Arguments that such a proposal as that of the Cambridgeshire Tuberculosis Colony must be difficult of realization are, of course, put forward. It may be pointed out, however, that most of these arguments are founded upon the experience of institutions run on what, perhaps, I may be allowed to speak of as strictly conventional sanatorium lines. It is stated, for instance, that patients will not consent to remain in an institution for any great length of time.

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Who desires this? If our imagination cannot rise beyond the possibility of retaining patients in an *institution* as the only means of segregation, we may give it up. It is not only unreasonable to expect a man voluntarily to undergo restraint for an indefinite period, it is against all precedent. A life filled with monotonous routine, purposeless work and unbounded leisure, whether for mischief or pleasure, is not to be thought of. Nor again is the continuous separation from the family to be tolerated. Both must be dismissed from our minds or overcome, if we are to make our colony a success.

Both obstructions can be overcome. Allow me to take, as a concrete example, Papworth Colony, of which, of course, I have now some experience, where experiments are in progress to test the conditions under which men will remain in the country although used to town life, and not town life only, but London life. My experience is that the first great question to be considered is that of a wage or payment for work done. The difficulties surrounding this question are many and complex. To begin with, we are confronted by certain provisions of the National Insurance Act, in which it is expressly stated that any man working for a wage forfeits his sickness benefit. Latterly, however, since it has been the practice in some institutions to allow patients to work, the dividing line between remunerative and non-remunerative occupation becomes difficult of definition, and no objection can in any case be raised to the institution paying to an After-care Association a subscription equivalent to the value of the work done; nor can there be any objection to that Association paying over to the patient a sum of money to supplement the sickness benefit, thus enabling his dependants to live in decent circumstances while the man is under treatment.

This is the procedure adopted at Papworth and this method of procedure opens out very considerable possibilities especially for the ordinary insured person. The usual plea put forward by an insured person, especially a married man with dependants, is, that it is impossible for him to live in luxury at a sanatorium, while he knows that his wife and children at home are asked to exist on 10s. per week, a sum sometimes supplemented by the Charity Organisation Society or by the Poor Law, but this is an extremely unsatisfactory method, for the average working man very naturally dislikes accepting relief in this form. In the method adopted at Papworth, the sickness benefit can be augmented (within limits) by *the man's own earnings*, and he

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has the satisfaction of feeling that even whilst undergoing treatment he is making a definite contribution towards the upkeep of his family, surely a better and more respectable proceeding than relying upon outside help. This method is new, but I hope and believe it will be found to be thoroughly sound. It will thus be seen that a very definite link is forged between the Colony and the After-care Association. The inducement to earn a wage is so great, however, that it is with difficulty men are restrained from putting in more hours of work than are prescribed. So contrary is this experience to that of sanatoria that I fear I may not be believed, but it is a fact. In our boot-repairing department during the first two months while the patients were still apprentices, it was a matter of surprise that the men could earn 12s. per week of thirty-two hours, at the rate of pay current for boot-repairing in Cambridge, this being the rate the men receive. It was feared that our greatest difficulty would be the supply of boots to be repaired, but by means of an advertisement in the local papers and printed cards which are placed in shop windows, the supply has been well maintained. The patient is paid 1s. 6d. per pair; it is therefore a simple matter of calculation for us to see that a fair number of boots must be repaired to enable the 12s. per week to be paid to these amateurs. Further, the two apprentices, one a Limehouse labourer, the other a college cook, have been taught by a practical boot-repairer—a London patient. This man has not only taught these men but has *earned* his money as an instructor at the same time. This makes clear four points: (1) That to change a man's trade is a practical proposition; (2) that the work can be carried on under proper hygienic conditions; (3) that the public have no objection to having their boots repaired by consumptives; and (4) that the labour must be subsidized to make it a practical proposition for the working-man. The moral to be drawn from this is, that once a practical proposition is placed before these men, a sound commercial proposition, not one from which they think the institution is making a profit out of their labour, they will seize the opportunity, for they know they are benefiting both from a health point of view and financially, and unless you can make the latter clear you can expect no success. I must again insist that these men are "middle" cases, that they have tubercle bacilli in their sputum and are cases which, left in their ordinary surroundings, would soon fall to the bottom of the scale. The practical boot repairer realizes that he is preserved from the economic struggle on which he would have to engage if

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he returned to London. The Limehouse man knows he cannot shoulder sacks of produce at the docks as he used to do and the college cook accepts it that without my certificate of good health the college kitchen is closed to him. When we take into consideration the fact that these men being ex-soldiers have a full pension of 27s. 6d. per week, it cannot be a matter of surprise that they consent to remain. We have stated that the Colony can and does offer better conditions of work—conditions that involve no impairment of a man's self-respect, while the State has the assurance that in return it is getting a good bargain in the elimination of infection. Similar results are being obtained in other departments, and from them it is possible to draw only the same deductions. The difficulty is that of demand and supply, and it is here that great effort is needed and a very good business brain required, but at present inquiries for goods and orders placed with us keep the departments busy. It will be said that of course this is the greatest difficulty of all, but it has been repeatedly stated in the past that the greatest difficulty was to get the men to work. Having demonstrated that the latter is not the case, I have confidence that the other difficulty will also be got over. The real solution of the question is a State subsidy for tuberculous labour and the introduction of labour-saving appliances to diminish the disadvantages under which a consumptive works. If his work can be turned to account—not in the way of reducing the cost of running an institution—who ever thought of reducing the cost of a hospital by employing chronic invalids on the staff?—but in making it contribute to the wage of such labour, the other part should be forthcoming from the State as its share of payment in return for the prevention of infection. It seems to me that the problem is then well on the way to solution. In any case let us get rid of the fallacy that tuberculous labour can be made to pay—*of the idea that all the money paid by the State is for the alleviation of symptoms.* Further, let us concentrate on humane and voluntary segregation by making it so attractive that few consumptives will face the difficulties and dangers of open competition if they have the option of the facilities I have indicated. Public opinion educated on these lines will soon insist on being rid of a source of infection so dangerous to its well-being. Once the facilities are offered, if offered in no miserly spirit, we may see the dawn of a new era in the treatment (using the term in the widest sense) of the disease.

The results of the Carpentry and Joinery Departments at

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Papworth are of considerable interest in that they show that there is an appreciable value in the labour of a consumptive, and that such labour can be turned to good account. At the head of the carpentry department is a trained carpenter and joiner—an ex-patient —who directs the work and instructs the patients. We are now convinced that useless work put forward merely as treatment is waste of time and energy, but we also find that immediately a patient comes to the carpenter's shop he is ready for a light but definite piece of work. There is no waste involved in this procedure nor is there any loss of valuable time. We have, however, to reverse the usual process of training, for whereas in an ordinary carpenter's shop the apprentice is first put to sawing and planing, in the Colony workshop he is instructed in the fitting together of parts which have already been prepared by those who have been longer at the work and have been passed on to the heavier grades of labour. The process is indeed reversed, but by means of a method whereby a patient is set to make one particular part, in fact is placed on repetition work, no time is lost and his labour is at once remunerative. His interest is also immediately aroused, as his skill develops so his strength increases, and the two factors combined place him on a higher scale of productive work. It is my experience that very few patients fall below the 25 per cent. standard even at the beginning of their instructional career, and the percentage increases monthly. On repetition work they may ultimately attain an average of 50 per cent., and even rise to 75 per cent. When this method of instruction is followed the cost of any given article is considerably less than one made from beginning to end by an amateur carpenter or even by a partly trained man. I suspect that our method has perhaps unconsciously been based on the experience of munition works, but from whatever source it has come it undoubtedly meets with very considerable success. Our method of payment for work done is arranged on the basis of an apprenticeship of two months, during which time no wage is paid. After that period a wage equal to the percentage of working capacity is given if recommended by the foreman in charge of the work. As the percentage of working capacity increases so the wage also increases and, as will be seen from the method of instruction just described, when the patient becomes fitted for more complicated repetition work the wage increases. Up to the present, by disposing of our chief product—shelters at the price quoted in the open market—we could during the major portion of

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the time have paid a wage not much below the trade union rate. Take the accounts of the last year to illustrate the financial side of our industry.

There were working in the shop during this period an average of twelve unskilled patients, and after paying the instructor's salary and cost of materials, but allowing nothing for interest on capital or depreciation, it would have been possible to pay each patient about five-eighths of the trade union rate per hour for skilled men.

It must be remembered, however, that the working day is but six hours, and that even if the labour could be paid for at the rate equal to that of a healthy person who is trained, the total at the end of the week would be insufficient to support a man, his wife and family in the way in which they should live. It will thus be seen that the question of a subsidy is a very necessary and urgent factor in the problem. We must not look upon this subsidy as a dole for the relief of the patient (for on this the amount would, according to our past ideas, be too great), rather must we look upon it as money expended for the protection from infection enjoyed by the community. Far better to have this assurance of protection for the community and comfort for the individual than to have the depressing picture of a family in poverty and distress vainly endeavouring to struggle on with an uncertain amount of Poor Law relief and charity without any such protection. In a colony such as we are trying to build up at Papworth, the families of our colonists, being readily accessible, may be so trained and educated that they may be made stronger and safer for the struggle of life than if they were allowed to remain in undesirable surroundings or conditions of poverty and want. However that may be, there is hope of a brighter future even though time may unveil some of our errors.

May I close by quoting the words of a consumptive—Washington Irving: "What, after all, is the mite of wisdom that I could throw into the mass of knowledge, or how am I sure that my sagest deductions may be safe guides for the opinion of others but in writing . . . if I fail, the only evil is my disappointment; if, however, I can by any lucky chance, in these days of evil, rub out one wrinkle from the brow of care or beguile the heavy heart of one moment of sorrow, if I can now and then penetrate through the gathering film of misanthropy, prompt a benevolent view of human nature and make my reader more in good humour with his fellow-beings and himself, surely, surely then I shall not have written in vain."

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THE SOCIAL ASPECT OF THE PROBLEM OF THE CONSUMPTIVE IN RELATION TO A COMPREHENSIVE SCHEME.

BY

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A Lecture delivered at The Royal Institute of Public Health.

AFTER a lapse of some twelve years, during which my work lay almost entirely among patients belonging to the more prosperous sections of the community, I have again come into close touch with the problem of the consumptive poor. Comparing my experience of to-day with that of the past twelve years, I am impressed with the wide gulf that separates the prospects of the consumptive among the industrial classes and those of his neighbour in a higher social stratum; I note also that many of the difficulties which beset my earlier efforts among the workers in Sheffield still remain, and that, as then, they lie at the root of what is termed the failure of sanatorium treatment. Since my Sheffield days, however, there has been one change of great moment, namely, the passing of the Insurance Acts. It is not too much to say that this legislation has revolutionized the outlook of those suffering from tuberculosis; while incidentally it has been the means of revealing the tuberculosis problem as we now see it. It is an axiom in medicine that to discover the cause of any ill is to take the first big step towards finding the remedy. In general terms, the factors which render sanatorium treatment a somewhat qualified success are well appreciated; it may not be inopportune, however, to refer to some of them more specifically, and to this end I propose briefly to draw upon my personal experience as Medical Adviser to the London Insurance Committee. It is superfluous for me to say much about sanatorium treatment; I would but emphasize that we have no specific remedy for tuberculosis, and that when faced with a case of tuberculosis of the lungs all that we can do is to restore and, subsequently, to maintain for a long period that natural immunity to the disease which is possessed by all of us in a varying degree, and thus enable the affected person to achieve his own cure. For the frank case of open tuberculosis, however favourable, permanent recovery cannot be looked for in less than a year; throughout this period the essentials of treatment must be available, particularly

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sufficient food, a reasonable amount of fresh air, and freedom from excessive fatigue. Viewed from this standpoint, residence for some twelve to sixteen weeks in a sanatorium must be looked upon less as a cure than as a means of education, although it may give the patient a good start on the road to recovery. Whether the desired goal will be reached or not depends upon how far the standard of the sanatorium can be maintained when he returns home. That it will be lowered is inevitable; the question is, will the fall be such that the effective treatment of tuberculosis becomes impossible? Reduced to its essential, home treatment is a matter of money; its efficiency is determined beyond all things by the weekly sum at the command of the patient. In fact, from first to last in his career, the fortunes of the consumptive worker are dominated by his social circumstances, especially by his income. Moreover, the incidence of tuberculosis is closely associated with this question of wage. Dr. Benjamin Moore has recently pointed out that the majority of occupations experiencing a very heavy incidence of tuberculosis are characterized by the stigma of intermittent and badly paid labour; conditions which result in low nutrition. Thus it is that the treatment of tuberculosis is as much a problem for the social reformer as for the physician, though neither the one nor the other can hope to solve it single handed.

Financial Difficulties of Patients.—In the first place, let us examine the conditions in which most wage earners with families dependent upon them find themselves when faced with the fact that they have contracted consumption. A few characteristic instances will suffice :—

H. W., aged 30, a painter; usual wage 40s. to 45s. a week. A sudden onset of symptoms of pulmonary tuberculosis necessitated an immediate cessation from work, and in due course application for benefit was followed by an offer of admission to a sanatorium. The patient's acknowledgment of this recommendation was accompanied by a request for immediate assistance for his family, otherwise he would be unable to take advantage of it. On inquiry I ascertained that his circumstances were as follows: He had a wife and one child of 9 years; his sole source of income was his sickness benefit of 10s. a week, of which 6s. was absorbed by his rent. Thus there remained a balance of but 4s. a week for the maintenance of his family. The patient's wife was shortly expecting her confinement, so was not able to go out to work and thus to augment the family's resources.

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H. T., aged 33, a compositor ; a case of early pulmonary tuberculosis. Offered a bed in a sanatorium, he refused it on the grounds of domestic difficulties. This man's circumstances were as follows: His family numbered seven ; himself, his wife, and five children all under 14 years of age. His usual income of 50s. a week had dropped to 10s. a week, namely, the amount of his sickness benefit. He paid 5s. 6d. a week for rent, leaving a balance of only 4s. 6d. a week. This patient elected not to go away and was recommended for domiciliary treatment. At this juncture his situation at home was relieved somewhat by the following expedients. Two children were sent to the care of relatives, and his wife obtained work at a wage of 24s. 6d. a week. In her absence there was no one at home to look after the sick man and the other three children ; moreover, for the maintenance of this family of five persons, which included a consumptive, there was even now, after payment of rent, less than 20s. per week, obviously an altogether inadequate amount.

Cases of this character come to my notice daily. I make a practice of inquiring into all cases of refusal to enter a sanatorium, and my experience is that while some cover an excuse to stay at home, the majority result from genuine difficulty—I refer more especially to civilians. Discharged sailors and soldiers usually plead the disinclination for further institutional life and discipline.

There is no doubt that anxiety as to the support of dependants determines many a wage earner to ignore the first symptoms of consumption and to refuse sanatorium treatment even when the nature of his disease has been revealed to him. Thus it comes about that what should be the inestimable value of early diagnosis disappears, and the favourable case is lost to be met again later as one with scant hope of recovery. It happens not infrequently that the fall in the amount of sickness benefit to 5s. a week, which takes place after twenty-six weeks, accentuates financial embarrassment. This is more likely to be the case when restoration to a capacity for work is but slow, or when there has been much delay in the patient's admission to a sanatorium. There are few more potent sources of hardship to a patient and of dissatisfaction to his medical attendant than a long "waiting list" for institutional treatment. Apart from proving an obstacle to early treatment, the economic difficulty is a common cause of unrest on the part of the patient while in a sanatorium, and often leads to the request of discharge

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when an interruption in serious treatment is most undesirable. The following is characteristic :—

A. W., aged 28, a taxi driver, earning usually 45s. a week. Found to be consumptive, he was admitted to a sanatorium. After a probationary period of six weeks he was recommended for an extension of stay but declined it. An interview then elicited the following information, which subsequent inquiry confirmed. For the support of his wife and family of three young children he had only his sickness benefit of 10s. a week, of which 5s. was earmarked for rent. He had borrowed money to tide him over the earlier weeks of his illness, and was not prepared to incur further debt. Finding no way out of his dilemma he left the sanatorium and resumed a full day's work. Within nine months he was bedridden and a hopeless invalid. So much for the financial factor as it affects the more initial phases of the career of the consumptive worker.

In the case of the patient who has just returned home from a sanatorium the problem of ways and means is often no less acute. If, happily, the disease has been of slight severity and response to treatment prompt and satisfactory, if further, the patient's occupation be reasonably suitable and his income sufficient, the outlook is promising. Such an association of favourable factors is the exception rather than the rule. More commonly the situation is something as follows :—

The patient returns home greatly improved, in his own opinion quite well, and is reported by the sanatorium doctor to be fit to start work. Actually the treatment received, though sufficing to bring about a complete disappearance of all symptoms of active disease, has not been of long enough duration to secure any true arrest of the morbid process, far less cure. Further progress and ultimate recovery depend entirely upon the ability to carry on the essentials of treatment. Above all things this implies something more than a bare living wage. This period is a critical one and full of hazard for the convalescent consumptive.

Though he be possessed of character and be industrious, and his wife also, his social conditions often predestine him to failure. The following history records a common experience :—

A. B., aged 35, insurance agent; stated by his employers to be steady and reliable. Admitted to a sanatorium as a patient who should make a complete recovery, he had been discharged nine months before he came to my notice, with the report "Disease

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arrested," "fit to resume work." He had subsequently worked continuously for some eight months without any apparent depreciation of health, but latterly symptoms of tuberculosis had recurred. Examination at this date revealed an extension of the disease of such a character that save for immediate and prolonged treatment, the patient's expectation of life could not be reckoned as much over twelve months. Although he admitted being no longer fit for his daily duty, the patient would not even consider the suggestion of his giving up work. He pointed out that to do so would, for a second time, plunge his family into poverty. He had a wife and three children, all under ten years. His salary was at his pre-war rate of 35s. a week; of this he paid 8s. 6d. a week for rent and 1s. 4d. a week for insurance, and other subscriptions, leaving some 25s. a week for the maintenance of the whole family, The patient's wife said that she found it quite impossible to provide her husband and children with enough food; moreover, she had been handicapped by a debt incurred during her husband's absence at the sanatorium. The patient remained at work. The sequel is not difficult to anticipate; the man steadily became worse until he was compelled to give in. There followed a brief but hopeless effort on the part of the wife to keep the home together, terminated by the death of the patient and the break-up of the family. It is to be noted that this patient returned to his usual employment and to his customary wage. What he earned, however, though perhaps just adequate under peace conditions, was such that under existing circumstances a proper standard of living could not be maintained.

One sees many patients, who, as the one just instanced, have resumed work but at an inadequate wage, in view of their particular requirements. Commonly this is due to having undertaken "light" work; for the most part this is unskilled, and in consequence ill paid. To the working classes even a slight drop in income is of considerable moment. Another group of patients who, after discharge from a sanatorium, for the time being restored to health and capacity for work, often come to grief comparatively early, is made up of those who have been advised to find employment other than that previously engaged in. To those thus situated the search for a new means of livelihood is always a trying and discouraging quest. It occurs too at a period when a man's worldly fortunes are at a low ebb, and when he is feeling the loss of the comforts of a well-found institution.

The following is typical of many: D. C., a discharged soldier,

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a favourable case recently discharged from a sanatorium. He had made an excellent response to treatment and had been on the highest grade of work given to the patients at the institution. He was well enough to recommence work and anxious to do so, but since the trade he had followed previously was not considered suitable he was looking out for a post which would command better conditions. Meanwhile he was living at home though he could ill afford to be idle. His family consisted of himself, his wife, and one young child. He enjoyed a better income than many similarly situated inasmuch as in place of sickness benefit of 10s. a week he had a gratuity from the Pensions Authorities of 20s. a week; this, however, was due to cease in ten days. When I saw him he had been looking for suitable work for nearly two months but without success. He had obviously begun to lose ground, a fact which the patient realized. The upshot was that he went back to his old trade. Within six months he was again seeking sanatorium treatment, but by this time his condition had much deteriorated and there was no prospect of any appreciable restoration of capacity for work. A still larger class of patients, who, their period of sanatorium residence over, have an almost hopeless future, is made up of those who are sent home with the report, "Improved, but not fit for other than light employment." I imagine that in London something like 50 per cent. of all cases discharged from a sanatorium come within this category. These patients, especially those with dependants, are placed in the same predicament as the man whose record I have just given, but with this difference, that being in a worse physical condition they find suitable employment still more inaccessible; at the same time having less resistance they are not so capable of weathering a period of relative or actual privation. The claims upon our serious consideration of this unfortunate group of patients are urged with great force by Dr. Varrier-Jones, for, as he points out, though still capable of work, they are incapable of competing with normal labour. At the present time these patients either live at home in a state of demoralizing idleness or resume a full day's work, which is all that is open to them, until the steady march of their disease renders them unemployable. In either case they merge ere long in the ranks of the chronic and incurable.

The brief life histories I have given epitomize the careers of hundreds of consumptives among the wage-earning classes. They show the manner of descent of the curable case and of the case

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which, in a higher social stratum, enjoys by no means a bad prospect, into the chronic consumptive whose progress must be progressively downward. They illustrate also how the failure to recover health completely within a comparatively short time often leads to a fall from tolerable comfort to a state bordering on pauperism, a condition from which it is most difficult for the working man to emerge.

At the risk of repetition, I quote one more history which, as it covers the whole period during which the patient was under observation, gives a more consecutive review of the downward career. Taken from the files at my office in Insurance Street, it shows a sequence of events which has many parallels among the records of the London Insurance Committee.

R. M., aged 36, a carman, married; family consists of his wife and three young children; wages 35s. a week. In May, 1916, he was found to be suffering from early tuberculosis affecting the apex of the left lung, and was recommended for sanatorium treatment by the Tuberculosis Officer as one who should do well. In the following month of June he was admitted to a sanatorium. In October, 1916, he was discharged. Disease apparently arrested; health fully restored; tubercle bacilli still present in the sputum; fit to return to work. He at once resumed his usual employment at his former wage of 35s. a week. A comparison between this man's income and that needed to keep a family of five persons in these days prepares one for the way in which this case developed. In March, 1917, the patient was reported to have had an hæmoptysis, and further sanatorium treatment was recommended. In due course he was discharged from a sanatorium, improved, but now definitely a case of somewhat advanced disease. From this point he worked irregularly, but with the help of extra nourishment supplied by the Insurance Committee, doubtless shared by the rest of the family, bare existence was maintained. In November, 1917, a social worker reported that the family were in distress. In February, 1918, the tuberculosis officer reported that the case was "advanced and hopeless," and "adequate treatment no longer possible." The man's wife was earning 25s. a week at a munition factory, which after payment for rent, and with the addition of 5s. a week, the patient's disablement benefit, allowed a sum of 23s. a week for the needs of the sick man, his wife, and the three children. The housing accommodation of the family consisted of two small rooms, one of which

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was used by the patient, the other being shared by the wife and the three children.

The doctor who sent this report added that the wife being away from home all day, the children and the patient, who was practically dying, were left uncared for. Thus, the working life of this case of early pulmonary tuberculosis, from the date he was discharged from the sanatorium, apparently well, was just six months.

The stage of chronic invalidism reached, other aspects of the consumptive problem come into view more prominently. Hitherto, the poverty resulting from the initial disability has been considered chiefly from the point of view of its bearing upon the prospects of the individual consumptive; it has been shown how it discounts the hopes of his permanent recovery, and may lead to a state of impoverishment which renders home treatment quite ineffective. It is not suggested that the large community of chronic consumptives is made up of those who, at one time, were amenable to treatment. Many, of course, are past hope of sensible amelioration when they first come under observation. In London, most of these cases receive a short term of institutional treatment, and on discharge at once enter the ranks of the unemployable, and, unless the family can adjust itself to the loss of the principal wage earner, into a life of poverty.

In these latter phases, the working career of the patient, for all practical purposes, is finished. He may indeed have some months or years of life before him, during which he will work fitfully, for the most part during the summer months. Still the end has come within measurable distance, and the most pressing practical question has become that of safeguarding the patient's family from infection and impoverishment. The conditions under which these cases of advanced disease live are often profoundly unsatisfactory; the patient cannot be cared for properly, neither can adequate precautions be taken to prevent his being a source of infection. Almost invariably the sole income of these individuals is their disablement benefit of 5s. a week. It is surprising how many single men and women contrive to live upon this small sum, eked out with occasional doles, grants of food, or other slight assistance.

The following, for instance, is by no means exceptional: Miss F., aged 40, formerly a machinist; was under treatment in a sanatorium during 1914, 1915 and 1916. Disease now advanced, but the patient is still able to be up and about. For long time

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her income has consisted of her benefit of 5s. weekly, and an allowance of 5s. a week from her former employers. Of this, she pays 4s. a week for the rent of her room, leaving her 6s. a week for all her requirements. Her doctor asks for extra food for her, as she cannot afford the necessaries of life; she will not entertain the idea of entering the infirmary. Patients suffering from advanced disease who live with their families are frequently a burden to them, financially speaking, since their contribution of 5s. a week does not enable them to pay their way. As an example, the following came to my notice a few days ago as the result of following up a request for a grant of food: The household comprises six persons, five adults and one child of 10 years. Two of the adults are suffering from advanced consumption. After payment of rent, the total income of the household amounts to 36s. 6d. a week, including the disablement benefit of one of the patients, thus leaving 6s. a week per head for expenses under all heads. The doctor reports that the parents of the sick persons will not agree to their removal, though this course would greatly relieve the situation. He adds that the two consumptives cannot be tended properly, and that the household is miserably poor. Sometimes, a whole family is found to be living practically on the disablement benefit of the former wage-earner, with the help of a grant of extra nourishment supplied by the Insurance Committee. For example: J. B., a widower, with seven children, of whom one is a soldier and the others still living at home. Income, 5s. a week benefit, and 10s. a week from the soldier son. Rent 11s. a week. The whole family are living upon the balance of 4s. a week, supplemented by a grant of food from the Insurance Committee. In such a case the grant of food to the patient is not serving a useful purpose; from the patient's point of view, it enables him to be independent of the Poor Law, but at the cost of the interests of a young family. It is in households of this character that one sees an association of conditions which are calculated to make for the spread of tuberculosis. Opportunity for massive infection in the shape of a highly infectious invalid; reduced resistance, consequent upon malnutrition of those with whom he lives, and overcrowding which permits of the continued exposure to infection of those who, for the time being at least, are most susceptible to invasion by the tubercle bacillus.

(To be continued.)

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Chemical Notes.

BY

ALAN W. STEWART, D.Sc., A.I.C.

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Report on the Work of Inspectors for Foods, 1917-18 (A. W. J. Macfadden, C.B., M.B., Report to the Local Government Board.—Some interesting information is contained in the report on the work of inspectors of foods which has recently been issued. *Food poisoning:* An outbreak occurred last November at the Sussex County Hospital, Brighton. There were thirty cases, with two deaths. From the excreta of the affected persons an organism was isolated differing from the true Gaertner group bacilli and agreeing with none of the recognized named varieties of micro-organisms hitherto associated with food poisoning. An identical organism was also isolated from the excreta of a kitchen-maid at the hospital who had handled the food which appears to have caused the outbreak. This kitchen-maid had not suffered in any way during the outbreak, and there was no record of any previous illness, but the evidence pointed to the fact that she had acted as "carrier" of the organism. Another outbreak of interest occurred in January last in Trowbridge and the neighbourhood; forty-seven people were affected, of whom two died. Inquiries showed that all the affected persons had partaken of pigs' chitterlings cooked on one day at a local eating-house. This eating-house, with others in the town, obtained all the chitterlings they used from a firm of bacon curers in the locality where pigs were killed and dressed on the premises. The methods of washing and preparing the gut at the bacon factory were found to be very unsatisfactory and quite insufficient to ensure the effective removal of the intestinal contents. From post-mortem materials obtained from the two fatal cases, an organism of the Gaertner group was isolated, and the evidence appears to point to the infection of all the food concerned being due to a single pig, killed on the day before the first outbreak, having been infected with this organism.

Importation of Liquid Eggs.—During recent years the export from China of eggs in liquid form, preserved with boric acid, has developed very large proportions. Prior to the war, relatively small quantities of this material were imported into this country, but after the outbreak of war large consignments arrived at certain ports in this country as cargoes in prize ships, and since then large quantities have been imported in the ordinary course of trade. These products occasionally arrive in the form of whole egg mixed, but usually the egg yolk and egg albumen are sent separately. In the latter case the albumen may be sent in a fluid state with preservative added, or in a crystallized dried form.

Samples of yolk taken from consignments arriving in the City of London were examined by the city analyst and found to contain boric acid in amounts varying from 1·35 to 2·08 per cent. When boric acid is relied on alone for preservative purposes, the amount aimed at appears to

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be 2 per cent. Sometimes, however, common salt up to 10 per cent. is used with a smaller amount of boric acid. It is contended that these large amounts of preservative are necessary for effective preservation owing to the length of the voyage and the passage through the tropics. Until comparatively recently the use of this liquid egg for food purposes was confined to the manufacture of cakes, biscuits, &c. When used for these purposes, the amount of boric acid in the finished food as eaten is reduced to about 5 gr. per pound. During the latter part of last year, however, liquid egg began to appear on the market in large quantities packed for domestic use in small tins and jars reputed to contain the equivalent of from 9 to 12, or more, eggs. In this form the product was available to the general public for use in milk puddings, pancakes, &c., and used for such purposes the amount of boric acid consumed by the individual would be considerable. There is also good reason to believe that large quantities have for some time been used in restaurants for similar purposes. The employment of these boricized products for domestic and restaurant use is open to serious objection. In the case of the smaller receptacles sold retail, some of the packers make a statement to the effect that the contents should not be used for omelettes or scrambled eggs; but even this small measure of protection is not available to the members of the public using hotels, restaurants, and similar places. In order to ascertain the amounts of preservatives used by the packers of these small receptacles and the veracity or otherwise of the statements as to the egg equivalent of the contents of the tin, an examination of a series of samples was undertaken by the Government chemist. The results showed the presence of boric acid in these samples in amounts varying from 49 to 113·4 gr. per pound. They also showed that, as compared with the composition of average genuine hen's eggs, the preparations contained added water, some of which was probably due to the addition of boric acid in aqueous solution. Another difference observed was that whereas in genuine eggs the weight of white is approximately twice the weight of yolk, in most of the samples there was more yolk than white, so much so that in spite of the added water the calorific value of the contents of the jars and tins fell, with one exception, within the range of that of genuine eggs.

The public health authorities of some of the districts concerned have made it a condition of allowing the importation of preserved liquid eggs that a guarantee shall be furnished by the importers: (1) that the material will be sold only to firms engaged in the bakery, wholesale confectionery, and allied trades, and that when used in products prepared for human consumption, the ultimate amount of boric acid contained in such products will be negligible in amount; and (2) that the egg will not be sold to the general public by retail over the counter, and that with a view to ensuring this it will not be put up in receptacles containing less than 7 lbs.

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Reviews.

The Boy Who Did Grow Up. By Newman Flower. London, 1919: Cassell and Co. Price 5s.

At a time when all the talk is of Reconstruction, of plans for the future health and well-being of the younger generation, it is pleasant to meet with a story which tells of a great and beneficent work for children already accomplished, and still being accomplished. The story is that of the work of the Barnardo Homes organization throughout the country, and it is told by Mr. Flower with an exquisite sympathy, a rare insight and imagination which must commend his volume to everyone interested in the subject—and who is not? Like most people Mr. Flower had imagined Barnardo's as "a place in some hidden recess of London, where dirty starved and beaten children were collected and washed and clothed and fed." The reality is pictured in these pages. It will astonish the reader as it has astonished the author. Sir James Barrie, in a prefatory note, remarks that every statesman should be compelled by law to familiarize himself with this work of Barnardo's before he decides what would be the best memorial of the war. We cordially endorse that remark. And we warmly commend the study of this volume as a preliminary step.

The Doctor in War. By Woods Hutchinson, M.A., M.D. London, 1919: Cassell and Co. Price 7s. 6d.

In writing this book Dr. Hutchinson has rendered a genuine service to the cause of Preventive Medicine. For the first time in warfare the doctor has been given a free hand, and he has responded by practically wiping out disease. Formerly the ratio was six to nine deaths by disease to one in battle. In the late war we have had sixteen deaths in battle to one from disease. Dr. Hutchinson tells how this revolution has been accomplished. The author was afforded the best facilities for studying his subject at each of the European theatres of war and with the Grand Fleet. Gifted with a keen observation, a ready pen, and a sense of humour (*si sic omnes!*) he has given us a book which is not merely informative and interesting but is one of the most attractive and fascinating of the war books we have read. Therein lies the service which the author has rendered to the cause. For the book will surely be widely read by the general public; and it is of the first importance that the public should understand and appreciate the meaning and tendencies of preventive medicine. The sooner ignorance and apathy are conquered the more swiftly will be created that "A1" community of which Mr. Lloyd George has spoken.

Manual of Bacteriology. By Robert Muir, M.D., F.R.S., and James Ritchie, M,D., F.R.C.P. London, 1919: Henry Frowde, Hodder and Stoughton. Seventh Edition. Pp. 753. Price 16s.

The popularity of this work continues as is witnessed by the publication of the seventh edition of this manual; opportunity has been taken to thoroughly revise the text matter and the bacteriological researches caused by the urgent requirements of practical medicine and surgery in the war have been incorporated. Thus the chapters dealing with cerebrospinal fever, bacterial and protozoal intestinal infections, tetanus, and the grave conditions occurring in wounds, have been enlarged and contain the latest results and information. New sections on infective jaundice and trench fever have also been included. There is abundant evidence of careful revision; new methods are noted and new illustrations have been added. Apart from the six good coloured plates, there are 200 excellent illustrations distributed throughout the text. The authors have succeeded admirably in condensing the best part of medical bacteriology and have compiled a very readable handbook. To all bacteriologists, pathologists and medical students we cordially recommend this work, to whom it is indispensable.

War Neuroses. By John T. MacCurdy, M.D. Cambridge, 1918: The University Press. Pp. 132. Price 7s. 6d.

This work is practically a reprint of the author's article published in the *Psychiatric Bulletin* of the New York State Hospitals. It has been written

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primarily for the medical profession in America and is a record of the writer's observations and study of cases of war neuroses amongst the British Expeditionary Force, which he made when he came to this country to inquire into the nature of the problems which would confront neurologists and psychiatrists of America as soon as that country participated in the war. The book describes the experience of one with a long record of skilful investigation of the psychoneuroses of civil life when brought into contact in British hospitals with the special forms of neuroses produced by the shocks and strains of warfare. This is an interesting book the merit of which lies not so much in the nature of the text-matter but in the clear and concise manner in which the essential facts have been tabulated and utilized to illustrate the special problems with which the neurologist and psychiatrist is confronted.

Handbook of Physiology. By Professor W. D. Halliburton, M.D., F.R.S. London, 1919: John Murray. Fourteenth Edition. Pp. 936. Price 16s.

Only a little more than a year has elapsed since the last edition of this work was published and we now have the fourteenth issue, being the twenty-seventh edition of Kirke's Physiology. The rapidity of the editions is a striking proof of its unabated popularity. Extensive alterations were considered unnecessary, only small improvements and additions have been introduced. In an appendix a new chapter on War Diet has been included giving a simple statement on present day necessities. The new edition is up to date and contains nearly 600 excellent illustrations, many of them in colours. The subject matter is well written and is a good example of what a student's text-book of physiology should be. For many years past it has proved the guide and trusted friend of students of physiology. This authoritative work should be in the hands of all medical students who desire a reliable text-book for gaining a real knowledge of the science. Professor Halliburton is to be congratulated on steadily increasing the usefulness of this book, which is eminently trustworthy and constitutes a valuable foundation for larger treatises on physiology.

Arthrometry or the Measurements of the Movements of Joints. By W. Wilbraham Falconer. London, 1918: John Bale, Sons, and Danielsson. Pp. 27. Price 2s. 6d.

This little pamphlet contains notes of a new and simple system for showing the mobility of injured limbs by means of an instrument called an arthrometer. It consists of a circular plated box about 4 in. in diameter, through the centre of which is fitted a spindle and carrying an indicator. A dial is also attached, marked out into degrees of half the circumference of a circle, and the indicator shows to what angle the limb has been moved. In restoring disabled men it is now not only necessary to treat the various forms of disability but also to measure and record the progress. This can only be done by clear and accurate data of measurements and the real effects of treatment correctly observed. The author's system is worth careful reading and will prove useful to those interested in the measurements of the joint movements.

The Seale Hayne Neurological Studies. Vol. i., No. 1. London, 1918: Humphrey Milford, Oxford University Press. Pp. 52. Price 3s. 6d.

The Seale Hayne Military Hospital, Newton Abbot, was opened in the middle of April, 1918, and was one of the first hospitals in England to be devoted entirely to the treatment of soldiers suffering from war neuroses. Lieutenant-Colonel Arthur F. Hurst, the officer-in-charge and editor, has now published the first number of these neurological studies which embody the results of a large series of investigations and researches. In the first issue there are articles dealing with pharyngeal anæsthesia, hysterical stigmata, Romberg's sign, hysteria and organic nervous disease, &c. Future numbers will include practical descriptions of the clinical aspects of the war, methods of treatment of war neuroses, as well as more theoretical papers on hysteria and other functional nervous disorders. This periodical is issued every two months. The first number makes excellent reading and this series will be a valuable addition to medical literature and will be assured of a wide circulation as soon as it becomes more known.

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PROGRAMME OF THE LONDON CONFERENCE, 1919.

WEDNESDAY, JUNE 25, TO SATURDAY, JUNE 28.

INAUGURAL MEETING

At the Mansion House, Wednesday, June 25, at 3 p.m.

President: THE RIGHT HON. THE LORD MAYOR OF LONDON (SIR HORACE BROOKS MARSHALL, LL.D.).

AT THE GUILDHALL.

Thursday, June 26. 10 a.m. to 1.30 p.m.

THE WORK OF THE MINISTRY OF HEALTH.

President: Col. WILLIAM R. SMITH, M.D., D.Sc., LL.D., F.R.S.Ed. Sheriff of London.

(*a*) "The Central Organization," by Sir H. Kingsley Wood, M.P.

(*b*) "The Local Administration," by Lieut.-Col. F. E. Fremantle, M.A., M.B., F.R.C.P., D.P.H. Consulting Medical Officer for the County of Herts.

(*c*) "Women's Work in a Ministry of Health," by Lady Barrett, C.B.E., M.D., M.S. Physician to the Royal Free Hospital, London.

2.30—5.30 p.m.

THE PREVENTION AND ARREST OF VENEREAL DISEASE.

President: THE RIGHT HON. THE LORD SYDENHAM OF COMBE, G.C.M.G., G.C.S.I.

(*a*) "From a Military Standpoint," by Col. J. Adami, M.D., F.R.S., C.A.M.C. Professor of Pathology and Bacteriology, the University of Montreal.

(*b*) "From a Civilian Standpoint," by Sir Malcolm Morris, K.C.V.O., F.R.C.S.

(*c*) "From the Woman's Standpoint," by Mrs. Mary Scharlieb, C.B.E., M.D., M.S.

Friday, June 27. 10 a.m. to 1.30 p.m.

HOUSING IN RELATION TO NATIONAL HEALTH.

President: Sir ASTON WEBB, K.C.V.O., C.B. President of The Royal Academy.

(*a*) "The Medical Aspect," by Professor E. W. Hope, O.B.E., M.D., D.Sc. Medical Officer of Health for the City and Port of Liverpool.

(*b*) "The Architectural Aspect," by Professor S. D. Adshead, M.A., F.R.I.B.A. Professor of Town Planning, University College, London.

(*c*) "The Citizen's Aspect," by Alderman Neville Chamberlain, M.P. Late Lord Mayor of Birmingham.

2.30—5.30 p.m.

MATERNITY AND CHILD WELFARE.

President: Mrs. LLOYD GEORGE.

(*a*) "The Protection of Motherhood," by Sir Francis H. Champneys, Bart., M.D., F.R.C.P. Chairman, Central Midwives Board.

(*b*) "The Protection of Infancy," by Lady Leslie Mackenzie.

(*c*) "The Protection of Childhood," by Col. A. Carless, M.S., F.R.C.S.

Saturday, June 28. 10 a.m. to 1.30 p.m.

THE TUBERCULOSIS PROBLEM UNDER AFTER-WAR CONDITIONS.

President: Professor Sir William Osler, Bart., M.D., D.C.L., F.R.S. Regius Professor of Medicine in The University of Oxford.

(*a*) "Tuberculosis Schemes," by H. Hyslop Thomson, M.D., D.P.H. Medical Officer of Health and Chief Tuberculosis Officer for the County of Herts.

(*b*) "Tuberculosis among Combatants," by Nathan Raw, C.M.G., M.D., M.P.

(*c*) "Tuberculosis Communities," by Noel D. Bardswell, M.V.O., M.D., F.R.C.P. Medical Adviser, Insurance Committee for the County of London.

Fellows, Members and Associates of The Royal Institute of Public Health can obtain Membership Tickets on application to the Secretary at the offices of the Institute. For other ladies and gentlemen the price of tickets is one guinea each.

All communications to be addressed to the Honorary Secretaries, 37, Russell Square, London, W.C. 1.

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Volume XXVII. JULY, 1919. No. 7.

THE RÔLE OF PORTS IN THE PROTECTION OF THE HEALTH OF THE NATION.

BY

PROFESSOR E. W. HOPE, M.D., D.Sc.
Medical Officer of Health for the City and Port of Liverpool.

A Lecture delivered at The Royal Institute of Public Health.

THE ports of Great Britain, which are the national barriers of defence against disease, link her intimately with foreign countries, with Dominions, and with Colonies, in every part of the civilized globe. She has therefore a greater concern than countries with less extensive shipping communications, with outbreaks of disease in any part of the world connected by sea, whether near or distant. Smallpox or plague, or any other infection, whether in India, in China, in South America, Canada, United States, or elsewhere, means the introduction of these diseases sooner or later into British ports; the greater the commerce the greater the risk; the peculiarity of Great Britain is the large amount of commerce centred within the comparatively small compass of her ports.

Ports may be, and in this country usually are, so administered that the inevitable arrivals of infection shall be properly dealt with, and rendered harmless, otherwise they would become not only centres of exchange for commerce, but centres of exchange and diffusion for disease also, which will break down the barriers of an imperfectly-defended port. These basic facts have been recognized for centuries. From the days when the Black Death reached south-east Europe from Asia, in the Fourteenth Century onwards, to the time of John Howard strict measures for its exclusion were adopted at many seaports, the most notable being those of Venice, where not only a lazarette for the receptible of sea-borne cases of disease was established, but a permanent health department was also instituted. The endeavours in the Seventeenth Century to control the importation of plague, led to the establishment of stations at various points round our own coasts, at which vessels from foreign ports were required to remain under supervision for forty days, hence the term "quarantine."

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John Howard, and other writers of his time, describe the then condition of the seamen and his surroundings; the close, dark, and confined quarters, the plagues of vermin, rats, lice, beetles, &c., the filth, the bad clothing, and starvation which were not only the common causes of disorder and mutiny, but found reflex in the insanitary and degrading conditions of the maritime towns in those days. Shortly afterwards the then Government decided that no ships or vessels be allowed to enter the Port of London, unless they brought with them a certificate of health from the port authorities whence they came; this was, no doubt, the origin of our Bills of Health. Other Orders authorizing vessels to be detained on their arrival from foreign ports were issued; these precautionary orders gradually led to the establishment of English quarantine. A partial explanation of the cumbersome methods of procedure may be found in the imperfect sanitary knowledge, and still more in the imperfect administrative methods which lent colour to the then prevailing belief that health interests and commercial interests were antagonistic, an impression than which nothing could be more false.

The Quarantine Act of 1825, which was designed to relieve matters, proved ineffective in practice, and vexatious in operation, but it lingered on until 1896, when it was finally repealed.

The growing magnitude of our foreign trade, and the unnecessary difficulties of carrying it on which the ill-considered methods of foreign ports occasion, led the British Government to take the important step of arranging an International Conference upon the subject. This was a step towards greater uniformity of procedure, and resulted in the present system of medical supervision of imported infections based upon the conditions of the ship as well as upon the health of the persons on board, and not upon the health of the port from which the vessel had sailed. A further valuable advance was also made whereby an interchange of information was provided for between foreign countries and our own in regard to prevailing infectious diseases in different countries; but this arrangement exists only between the various Governments which signed the Convention resulting from the International Conference.

The most recent of these international agreements is that known as the Paris International Sanitary Convention of 1911-1912, which provided, amongst other measures, for the interchange

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of information regarding the presence of plague or cholera within the areas of the countries signing the Convention, and which also provided for measures to be taken by the same countries in the case of plague-infected rats being found on shipboard. One of the weak points, however, in agreements of this character is that they influence only those countries which participate in, and agree to abide by them, and these countries being as a rule the most enlightened and the most advanced, are the least dangerous from the point of view of international infection.

Absence of a good standard of sanitary administration is usually accompanied by want of appreciation of the *degree* of risk, or the *amount* of danger associated with infection in the various localities. In other words, mal-administration and ignorance are usually associated. For example, no one doubts that the methods adopted when plague is introduced into the average British port rob the incident of any really serious significance, so far as dangers to the public health are concerned. The same observation would apply no doubt to Japanese, or United States, and many other ports; but on the other hand these are ports in which we know the administration is not effective, and consequently plague at such a port is a menace, not only to that port but to its shipping, and, through its shipping to all other ports with which it trades. It is in ports such as these that archaic methods, reminiscent of the old Quarantine Acts, are still in operation, to the great harassing of shipping, and obstruction of commerce.

The object of an agreement is to safeguard the mutual interests of the parties concerned. If some of the parties are in ignorance or suspicious as to the circumstances of the other no satisfactory arrangement can be come to. It is clear that the first essential in safeguarding international health interests is a thorough and mutual understanding of the sanitary conditions of the various ports concerned. Vessels arriving from a notoriously insanitary port are justifiably liable to more exacting restrictions than those arriving from a notably healthy port; one of the problems we have to solve is, how these variations shall be met. British, Foreign, Colonial, and Dominion Ports differ very considerably in administrative standards, and, apart from this, inward vessels may come under suspicion on account of the prevalence of disease at the port from which they sailed. Nothing but advantage would result from the

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perfection of a system by which the sanitary conditions of all important ports shall be common property and common knowledge amongst all of them throughout the world; by this means confidence would replace suspicion and doubt. We owe a great deal to the United States as well as to our own Local Government Board for the diffusion of useful information in these respects, but it falls short, far short, of the knowledge which ought to be in mutual possession. It is in the interests of international health, as well as of shipping, that the importance of a swift and unrestricted communication between ports should be recognized, and it is unpardonable that commerce should be hampered by avoidable disease, or because one port is regarded as a bogey by another port. Let me give one illustration in connection with the port of Liverpool—no doubt there may be many such in connection with other British ports—the arrival of persons affected with plague gives rise to delays, costly and vexatious, to outward bound vessels on their arrival at a certain port in the Southern States of America, and entails much correspondence and interchange of views with the Consulate representatives, Local Government Board, Foreign Office, American Authorities, and Shipping Companies. The view of the Health Department of the Port of New York, at which it was apprehended similar restrictions might be imposed, is shown by an extract from the official report, which points out that there may be difficulties in the problem presented by West Indian and South American ports, to those at New York: "Our commerce with Liverpool," they state, "is great in volume and value, the steamers are huge passenger liners, and the circumstances in Liverpool do not warrant the employment of measures asked for elsewhere, as the result would be to inflict an enormous damage to the commerce (there the one touch of Nature) of the port of New York, not justified by the damage against which it is our duty to guard." Obviously, if it were possible to enlighten all the ports in the world with which all the ports in Great Britain deal to the same extent as the understanding between the Port of Liverpool and the Port of New York, it would be to the advantage of all the nations of the world. One of the first duties of the new Ministry of Health should be to set this matter on a proper basis, and to establish confidence between the nations. No other body than one, such as a Ministry of Health, dominated solely by the duty to prevent disease, can accomplish this. A Central Bureau of Informa-

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tion, whose business it should be to promote the necessary interchange of knowledge, is a vital need which should be met without further delay.

The notifiable infections coming under control are, for administrative purposes, divided into two categories :—

(1) Those diseases which are endemic in *this* country such as scarlet fever, measles, typhoid, &c.

(2) Those endemic in *foreign* countries, e.g., plague, cholera, and yellow fever.

The object of the division is not so much that the diseases under the second heading are of a more dangerous or formidable character than the others, but to the determination to exclude them from gaining endemicity in countries in which they have hitherto had no permanent foothold, and to ensure this, agreements have been reached calling for the most drastic measures of repression. The aim is, or ought to be, to apply these measures efficiently, but without any *unnecessary* restrictions on shipping.

Cholera, in former years, was quite a formidable disease to deal with in this country, and many severe outbreaks, owing their inception to importation, occurred in various parts of the country. These were chiefly importations by emigrants on their way to America from continental countries through east coast ports.

The premier place of cholera has, at the moment, been usurped by plague, which, since its outbreak in the Far East in 1896, has become almost world-wide; and the difficulty of its eradication, or indeed of circumscribing the area of infection, has been largely due to its concurrent prevalence as an epizootic in rats and other rodents. The difficulty of dealing with vessels harbouring rats affected with this disease, or coming from infected ports, has been great. We cannot, of course, ever expect to *prevent* this formidable disease reaching our seaports, but we have practically succeeded in preventing its spread. Local infections have repeatedly been introduced, e.g., at London and Liverpool, at Cardiff, Leith, Glasgow, Hull and elsewhere; circumscribed importations have been introduced by infected rats landed presumably in merchandise, and these importations, as may be readily imagined, have proved difficult to control.

The results of the work of the Port Sanitary Authorities in controlling this infection have inspired sufficient confidence abroad, that no foreign country has ever thought it necessary to take any exceptional precautions against British shipping, or to quarantine

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our vessels on arrival in their harbours, but in certain individual foreign ports much delay and loss have arisen consequent upon undue timidity, or indefiniteness, or insufficiency of international agreements, or with those who have only partially assented to those agreements.

Standing in a category almost alone, another illustration of the valuable results of port sanitary administration in the protection of the country generally is seen in the case of smallpox. The prompt diagnosis and isolation of cases, the vaccination of crews of vessels, and all contacts who will accept it, has reduced the chances of the spread of this disease to a minimum. It is well known that an epidemic of smallpox in this country is long overdue, and the increasing neglect of vaccination in the country cannot be contemplated without concern.

In the past, malaria has been viewed in this country as a disease of tropical interest only, and the possibility of its introduction and establishment here was little thought of. The outbreak of war, however, raised the possibility of local outbreaks of malaria in the United Kingdom; numbers of troops are being returned invalided with the disease from malarious countries. It is known that the anopheline mosquitoes are very numerous in some localities in this country, so that local outbreaks are not impossible. In October, 1917, I called the attention of the Local Government Board to the circumstance that malaria was very prevalent at certain ports on the West African Coast, chiefly Dakar and Sierra Leone, that convoys calling at those places were liable to widespread infection amongst the crews, and that vessels arriving at our ports have had large numbers incapacitated by the disease, in some instances almost every member of the crew being affected. Under these circumstances the Liverpool Port Sanitary Authority considered it advisable to issue instructions of a precautionary nature to the masters of vessels, advising prophylactic measures, and the administration of quinine before entering an infected port, whilst in that port, and for some days after leaving.

All shipping companies trading to this coast are now taking these precautions, and, where strictly carried out, the results have been very satisfactory.

One of the first essentials is that official guidance for the consular bodies should be available on health matters.

The consular body have very important functions imposed upon them in reference to these matters, but I feel that I am voicing the

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general experiences of Port Medical Authorities when I say that the amount of *intelligent* interest taken in public health matters by the members of that body has a very wide individual variation.

The United States Consulate, as we all know, and one or two others, evince a great interest in all health matters, but the great majority seldom trouble about them unless something new and unusual happens, when those who have hitherto taken but little interest evince an altogether exaggerated and unnecessary anxiety and alarm difficult to allow but which happily is wholly absent from those who have a knowledge of the facts and have kept in touch with those responsible for public health administration. I may here remark that the consular body is normally very much larger than would generally be supposed. In Liverpool, prior to the war, there were representatives of no less than thirty-eight foreign Governments, only a small minority of whom are parties to the Conventions quoted. It is obvious that in times of excitement considerable mischief can be done, especially to shipping and commerce, by unnecessary delays in clearing outgoing vessels in foreign ports by refusal or hesitation to sign bills of health, or endorse essential documents.

But Port Sanitary Authorities have *now* a very large share in obligations of quite another character than those incidental to the prevention of epidemics. These are concerned with the health of the seamen, and as a consequence the sanitation of the ship; it is no reflection on departments primarily concerned with commerce which hitherto have dealt with these matters, when I say that the influence of the Port Sanitary Authorities gave a stimulus to the welfare of the seafaring population, which has proved of incalculable benefit to them; I am glad to see in the amended draft of the Ministry of Health Bill, that a question so vital to the nation as the care of the health of its seamen is no longer to be excluded from the purview of the Ministry of Health. It is to be hoped that the transfer will not be delayed.

The sanitary conditions of the Mercantile Marine have a very distinct influence upon health administration on shore, and are matters of great importance to this country, because we rely upon the health environment of the seamen as a definite part of our first line of defence against imported infection. Give the sailor a healthy and sanitary ship, with properly constructed quarters and the means of keeping himself clean, provide hospital accommodation on board available when he falls sick, and we shall materially

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reduce the difficulties which arise in connection with sea-borne disease. It is noteworthy that in many instances the impulse of these improvements in shipping sanitation, and in the welfare of the seamen, emanated from the shipping companies themselves, and not from any Government Department. A noteworthy example may be mentioned, although there are many others, in the case of Messrs. Elder Dempster and Co. The late Sir Alfred Jones who controlled this company, was a pioneer in many things, and amongst others in improving the pay and the comforts of seamen on British ships. The fact that he established libraries for seamen on the ships under his control may be mentioned to indicate the very advanced views which he held in regard to the consideration due to the seamen.

The subject of improvements in shipping sanitation is now receiving full consideration during the construction of new vessels, and in the Government Standard Ships. Difficulties exist, and will continue so long as the health-needs of the seafarers, whether crews or emigrants or ordinary passengers, remain unrecognized by a Ministry of Health.

Besides the care of the seamen there is that of the passengers generally, including the highly important emigration trade which in pre-war years reached great figures, also the supervision of aliens in regard to their physical fitness to enter this country.

The subject of venereal diseases is one of immense importance to a seafaring, as well as a civilian population, and in pre-war days it was the practice (long established) of the boarding Medical Officers of the Port of Liverpool to hand to sufferers pamphlets giving information and advice regarding the nature of these complaints, and indicating a suitable hospital at which the patient was advised to attend. Recent developments, following upon the Report of the Royal Commission on Venereal Diseases have greatly facilitated this work. Following the arrangements in the scheme adopted by the Liverpool City Council, and approved by the Local Government Board, information as to the facilities afforded at the various treatment centres, and the days and hours of attendance for medical advice, is freely circulated amongst the crews of vessels arriving in Liverpool, and a suitable poster entitled "Health of Seamen" is now exhibited in the crews' quarters, or other appropriate place, on every ship. In this notice the ailments and illnesses associated with a seafaring life are set forth, and a few simple rules given by which the dangers may be avoided.

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The incidence of the well-known animal disease anthrax amongst a community is always closely associated with the handling of infected animal material, such as the carcases of animals who have died from the disease, or animal products derived from such sources. Hides, wool and hair are therefore sources of danger, especially those which are imported from abroad, where few, if any, precautions are taken against this disease. Imported products such as wool, hides and hair, from the East Indies, Russia, Siberia, Turkey, Africa, China and many other localities, are frequently dangerous when handled or sorted, and the dust arising during these operations frequently contains the highly resistant spores of the anthrax bacillus. These spores may be inhaled or swallowed, but more usually collect with dust in the clothing, or find an entrance into the broken skin by a cut, or bruise, or scratched pimple, or be rubbed in by the dusty fingers or clothing.

Although wool, hair and hides are usually dispatched inland to be manufactured, yet these products are frequently stored, sampled and auctioned in our seaport towns.

The infection of anthrax is not confined to those who handle such materials, but cattle in this country are not infrequently infected by the consumption of foodstuffs which contain spore-bearing dust. This dust may have contaminated grain, or cattle cake, or the ingredients of the latter, during shipment in foreign ports, or during the voyage. Precautions are therefore necessary to secure that where a cargo containing animal products likely to contain infection is carried in the hold, the most thorough disinfection is carried out before such places are again used for carrying any cargo likely to be used for cattle food.

In Liverpool, notices and circular letters have been distributed to enlighten workmen and their employers as to the danger of this disease, the methods of its spread, and the need for prompt medical attention when infection occurs. The Government Departments concerned have issued Regulations regarding all these dangerous occupations, and in the Port of Liverpool additional precautions have been widely advocated.

The recent cases of anthrax arising from the use of infected shaving brushes will be fresh in the public mind. The infection arose from the use of contaminated goat hair which had not been suitably disinfected before being manufactured into shaving brushes. The subject of the disinfection before importation of these suspected, or infected, wool, hair, &c., has engaged the careful attention of the

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Anthrax Committee of the Home Office, with the result that the establishment of fully equipped and adequate disinfection stations is recommended at suitable collecting stations in the countries of origin.

The Aliens Act of 1905, which has been suspended during the war, was valuable from many points of view, but its efficiency was made largely nugatory, owing to the modifications which allowed vessels carrying less than twenty aliens to land these passengers without any medical or other conditions as to their physical fitness to enter this country, or the possibility of their becoming chargeable to the rates. Another anomaly was that an alien was defined as "a steerage or third class passenger," hence saloon or second class passengers were exempted from these provisions. It is quite true that under the Act many persons have been rejected who were suffering from phthisis, trachoma, venereal disease, and other dangerous complaints. On the other hand many of them returned to this country, in smaller batches than twenty or as second class passengers, and found unimpeded routes provided for them by the provisions of the Act.

It will be borne in mind that it is in the discretion of the Home Secretary to determine the status of the vessel, as well as of the alien immigrant. There is no reference it will be observed and no consideration paid to any health question whatsoever.

Since 1908, when the examination of imported foodstuffs was inaugurated by the Local Government Board in all our ports, the amount of inspection work carried out by the food inspectors at the various ports has been enormous. During the first two years following the inauguration of these Orders the amount of diseased meat condemned was very large, but since then the quantity has been considerably reduced, greater care being exercised in all the processes connected with the preparation, packing and transport. In addition, the quality of the meat foods has vastly improved, it being requisite for our food inspectors to see that meats from foreign countries have been properly stamped and labelled, by recognized inspectors at the port of export, and that it is so packed as to be easily and rapidly examined at British ports.

Foodstuffs condemned as unfit for human food may be ordered to be totally destroyed, or may be released for industrial purposes, e.g., pig or poultry foods, patent manures, &c., but it is very necessary that such destruction or industrial utilization should be carried out

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under proper supervision, and in all such cases guarantees are obtained to ensure this being done.

I do not think that such a complete and thorough system of inspection of imported foodstuffs exists in any other country in the world.

The administrative work of the Port Sanitary Authority has been largely augmented by the war.

Much valuable work has been done in assisting in the diagnosis of infectious complaints, in providing hospital accommodation, and in removing cases thereto. In Liverpool the supervision of the disinfection, cleansing and certification of vessels carrying troops has been of almost daily occurrence, and has involved an enormous amount of work. Vessels carrying American troops have had to be disinfected and prepared ready for sea again with the least possible delay, and when it is realized that ten to fifteen of these vessels may enter a port in a convoy the work entailed may be well imagined. The general freedom from infection of the large masses of troops, probably far exceeding a million, arriving at Liverpool has been surprising as it has been gratifying. The diseases dealt with, from time to time, included measles, mumps, diphtheria, scarlet fever, and malaria, and on rare occasions, cerebrospinal fever and smallpox. The most serious incidence was that of influenza during the last year.

In the same connection mention may be made of the large importation of horses and mules for Army purposes, which has been a source of anxiety in connection with diseases such as anthrax, glanders, &c. Careful disinfection and cleansing of all stalls, fittings, litter, &c., on board ship has been carried out in conformity with the joint views of the Board of Agriculture and the Ministry of Shipping, particular attention being paid to watering troughs and buckets on those vessels, owing to their great liability to become channels of infection.

Port sanitary administration will benefit by these valuable war experiences. The work will be carried on at a higher level of efficiency, and many new phases of development will appear in the near future. The health administration of ports all over the world will be considered of first importance, not only in safeguarding the health of the nations, of which they are the first line of defence, but also from the international standpoint. There can be no doubt that international co-operation to prevent disease of all kinds will be more in evidence than in the past. Already inter-

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national Conventions have arranged many matters in regard to plague and cholera. Why should such conventions not deal with smallpox, enteric fever, and other infections which are now endemic in certain regions of the world? Much good would result from a consideration of this subject.

An International Bureau of Hygiene has been established in Paris under the International Sanitary Convention, the object being to publish information of international interest regarding infectious diseases and hygiene generally. The United States Public Health Service also publishes information of a similar valuable character.

The English Local Government Board has recently issued a short summary of information regarding the presence of plague, cholera, and smallpox, in certain foreign ports, and amongst various valuable publications Dr. Bruce Low's report on the world-wide prevalence of smallpox and other diseases has been most helpful.

An international interest in the extermination of plague and disease carrying rats, and other vermin, is greatly needed. Fumigation of vessels, in order to clear them of rats must be arranged for regularly, and be carried out by a recognized and systematic method. Certificates of satisfactory fumigation will be issued by the responsible Health Authority's Medical Officer. This will avoid the annoyances which have frequently arisen in connection with this important subject of rat extermination. Much improvement will be required, however, in the personnel and administration in the health services of many foreign ports before a mutual confidence can grow up between the various port health authorities in regard to the methods adopted; in fact it would be a good thing if an international standard were adopted in this most important subject.

This short review of the health administration of our ports, in its relationship to the general health of the nation, will, I trust, serve to emphasize the great importance of this sanitary service, and afford a glimpse of the future international effort which must be made to unify all our health work in order to protect the health of this country as well as that of others with which we have close ties of friendship. Let us have a League of Nations, not only to prevent a recurrence of the devastation of war, but also to minimize the amount of avoidable sickness and death consequent upon the prevalence of disease, and further, to avert the commercial loss associated with it.

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INFECTION AND DISINFECTION IN WAR TIME.

BY

PROFESSOR JAMES M. BEATTIE, M.A., M.D.,
Professor of Bacteriology in the University of Liverpool.

A Lecture delivered at The Royal Institute of Public Health.

(*Concluded from p.* 141.)

Tubes and plates of bacteria were exposed in various parts of the room, but I was not able to detect the slightest effect in the prevention or even the inhibition of growth, unless in those into which actual droplets of the antiseptic fell. Uninoculated tubes and plates were quite as fertile after exposure as before, though they were exposed for much longer periods than were the patients. The antiseptic laden air was drawn through tubes containing bacteria for twenty and thirty minutes, but no trace of inhibition of growth was detected. I and members of my laboratory staff exposed ourselves to the spray of $ZnSO_4$ and chloramine right over the apparatus, breathing vigorously all the time, but swabs from the throat taken immediately before and an hour afterwards showed practically no difference in bacterial count—and here we were dealing with comparatively clean throats. Similar experiments were carried out at the contact centre, the swabs being taken from the patients before being sprayed and shortly afterwards as well as on the following morning. No differences could be detected. With the chloramine spray, the swabs were dipped in starch iodine and the nose and nasopharynx were examined immediately after spraying. No trace of chlorine was ever found in the nasopharynx, and we could detect it only for a short distance from the anterior nares. Further, after exposing patients in the usual way to the spray of $ZnSO_4$, swabs were immediately taken from the nasopharynx and submitted to chemical examination but not a trace of any zinc compound was to be found. The patients objected to being placed in the spraying chamber because of the irritation to the eyes and nose. This puzzled me at first for it occurred with $ZnSO_4$ as well as with chlorine preparations, and it was only after experiencing the irritation myself that I suspected the cause.

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Tests soon confirmed the suspicion that the irritation was due to formaldehyde produced by the action of the red-hot copper on methylated spirit. Certain alterations were made on the spray, but these merely led to a more thorough distribution of the formaldehyde, not to a lessening of the amount. My view, after the most careful tests, and after a somewhat prolonged daily use of the apparatus, was that it was quite ineffective as a means of disinfecting the nose or nasopharynx of carriers. Before the use of the steam spray and after it had been abandoned, our contacts were treated by hand spraying—(our numbers have never been large and hand spraying has been easily carried out)—with an antiseptic made by electrolysing a solution of 3 per cent. of common salt—a solution which is now known as "electrosal." As I have already indicated I am not able to estimate its value in the treatment of carriers of meningococci, for though all our cases cleared up quickly, I believe that many cases clear up as a result of removal to open healthy areas quite independent of any antiseptic treatment. Still some of our cases are striking. Three cases were under treatment with the steam atomizer, using $ZnSO_4$ daily for four weeks and every swab showed the characteristic organisms. The treatment was then changed and in three days after the use of "electrosal" the organisms had disappeared and the patient remained free on the two subsequent examinations. Two other cases with typical organisms of Type II were put under daily treatment with the steam atomizer, again with $ZnSO_4$. On the second examination the organism was not found in one but was present in the other. In the third and fourth examination it was present in both. This last examination was made three days after "electrosal" by the hand spray had been substituted for $ZnSO_4$. On the fifth examination both cases were free and remained free on the sixth, seventh and eighth examinations. As I have already indicated I do not think that this evidence proves the efficacy of "electrosal" over other antiseptics, but it is certainly suggestive of its value. The proof, however, must be based on a large number of cases and particularly a number of chronic carriers.

Not being able to get these cases it was decided to use this antiseptic in the disinfection of throats, of carriers and others infected with diphtheria, &c., and the results of the earlier parts of this work were published in the *British Medical Journal*, February 24, 1917. This work was continued for over a year and

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the later results have borne out fully our earlier work, viz., that "electrosal" is an efficient throat disinfectant, and that if used properly in cases of diphtheria it will shorten hospital residence by from seven to ten days, and that carriers will very seldom be found. In my opinion disinfection of the throat with suitable antiseptics is one of the most important factors not only in lessening the carrier-rate but in effectively checking the spread of many infective diseases. To me it is extraordinary that to-day, even in our infectious diseases hospitals, regular and thorough disinfection of the throat in cases of scarlet fever, measles, and even diphtheria is not carried out. I am quite convinced that if this were done from the earliest stages of the disease we should have less carriers and less of the complications associated with these diseases. The antiseptic must be properly chosen. It should not irritate the throat and it should not be one which coagulates the albuminous secretions and thus form a protective coating for the bacteria. My view is that it should be a routine practice in every infectious diseases hospital to disinfect the mouth, nose, and nasopharynx at least once every day. But I would go further than this. I would require that in every school and institution in which children are kept there should be a daily drill—shall I call it "nose and throat drill." Our school medical officers are much concerned about enlarged tonsils and adenoids, but in my experience they give little attention to the cleansing of those areas in which diphtheria, scarlet fever, probably rheumatic fever and measles, as well as many cases of tuberculosis take their origin. I remember many years ago a prominent business man in Sheffield telling me that his children rarely had a cold and that they had escaped all the infectious diseases, and he attributed this to the fact that every morning he had insisted on the disinfection of their nose and throat. He may have attached too much importance to this disinfection, but I have no doubt that there was a good deal of truth in his contention. We cannot prevent assembling of children in schools, &c., but we can teach them that cleanliness of their mouth and upper air passages is as important as cleanliness of their hands and face. Half an hour spent each day in throat disinfection would pay the nation much more thoroughly than many of the half hours spent in attempting to instil knowledge which is going to be of precious little value to the majority of us in after life.

In regard to disinfection in connexion with intestinal diseases

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many rules have been laid down in regard to typhoid carriers which are equally applicable to the carriers of dysentery, &c.

It has unfortunately to be admitted that the treatment of the carrier is at present in a most unsatisfactory state. Ledingham in his report to the Local Government Board says: "We have to deplore the fact that so far the attempts to cure intestinal carriers has not yielded results affording convincing evidence of their success." This was said of typhoid carriers and evidence is accumulating that the problem of cure in regard to dysentery carriers is equally difficult. Much was expected from vaccines but they have proved useless, and at present we have no antiserum which can be said to have yielded satisfactory results. In reviewing the literature in relation to chronic dysentery I have not found much evidence of persistent treatment by washing out the large bowel with antiseptics. Chloramine and eusol have been used but not in my opinion with that thoroughness and persistence which the cases demand. I have not had the opportunity of trying "electrosal" though I have on several occasions tried to obtain permission. Unfortunately, the bacteriologist has no access to patients, except through the physician and surgeon. Persistent and thorough washing out of the bowel in a number of chronic dysentery cases—cases which are not of much interest to the scientific physician—is not a work which he takes on lightly—and my answer has always been we have tried washing out with chloramine or eusol without the slightest benefit, and it does not seem worth while to continue with anything else. This is, of course, a very unscientific position and a position which is an injustice to the patient, but I have so far been unfortunate in meeting this obstacle in my investigations in regard to dysentery. Investigation, yet of a limited extent, has been carried out in cases of infantile or summer diarrhœa, and the results are striking though at the present they are too limited to be of great value.

Three wards in a children's hospital were taken—X, Y, Z.

Ward X.—There were during the period under review 25 cases: 13 were treated with "electrosal" with 2 deaths; 12 were treated with saline injections with 6 deaths. Other treatment, dieting, &c., was carried out, but it was the same in both groups of cases.

Ward Y.—Permission was not given for the use of "electrosal." There were 21 cases with 8 deaths.

Ward Z.—There were 15 cases: 5 were treated with "electrosal,"

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with 1 death; 10 were treated with saline injections, with 5 deaths. Thus of the 18 cases treated with "electrosal," 3 died; 1 of these died soon after admission before any treatment could be effective. This, then, gives 2 deaths in 17 cases, or a percentage of over 88 per cent. of recoveries. Of the 43 cases which received no "electrosal" treatment, there were 19 deaths—5 of these should be written off as hopeless cases, giving 14 deaths in 38 cases, or a percentage of recoveries of rather less than 64 per cent.

In dealing with disinfection in cases of intestinal diseases, it must always be remembered that infection is frequently conveyed by the hands which are readily contaminated with the infecting bacilli during defæcation, and sometimes urination, and that the infection may be spread by soiled body and bed linen. That the bacilli get transferred to other individuals frequently by unclean hands by direct contact or by indirect contact, e.g., by food-stuffs, &c. The fly as a carrier has been very prominent during the last few years, and the part this insect plays is, no doubt, very important; but we are apt to forget that the fly is not the only culprit. For years in Germany, instructions have been issued to typhoid carriers as to means for preventing infection. In 1908 Davies and Walker Hall, of Bristol, issued a very valuable pamphlet with suggested instructions to typhoid convalescents. These are equally applicable to dysentery convalescents, and I therefore give you to-night the main points in this pamphlet. "The convalescent," they say, "may be the unconscious means of transmitting the disease to his, or her, own family or friends. Cooks, male or female, dairymen or dairywoman, milk vendors, greengrocers, butchers, fishmongers, provision dealers, workers in cocoa, chocolate or confectionery, waiters and waitresses, and the mother who prepares food for the family, form a class of convalescents in which the opportunities of transmission of the disease are very frequent."

(1) The hands and nails should be thoroughly washed, first in disinfectant solution, then in soap and water, and well rinsed before touching any foodstuffs, especially milk.

(2) After the bowels are opened or the bladder is emptied, the hands and nails should be at once disinfected and washed.

(3) Strong disinfecting solution should be poured over the stools, &c., before the plug of the watercloset is used, or the lid of the dry closet is put down.

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(4) When the motions are loose, the risk of infection is increased, and additional care should be taken.

(5) The convalescent should periodically visit the medical attendant, so that the blood, &c., may be tested, and measures may be taken to control the action of the germ.

I would call special attention to No. 3 of these conditions. This is especially important just now, when so many soldiers who are, or have been, infected with one form or other of dysentery, are about our streets and using the various public lavatories. It is rare to find these lavatories disinfected regularly, and yet, in my opinion, it should be a rule that after every user of the watercloset, some efficient disinfectant should be used to cleanse both the basin and the seat. It would be well that disinfectant should also be used before the usual flushing takes place, and this might easily be managed by having the flush, not of water only, but of some disinfectant solution of sufficient power to destroy the ordinary bacteria in a few minutes. There is no difficult engineering problem in making such an antiseptic flush.

In regard to the present method of declaring convalescents free from infection by examination of the stools and urine and finding no evidence of the causal organism on three successive occasions, I have already noted the fallacy in this method. It can hardly be questioned that many carriers escape through this wide meshed net, and it is difficult to see how any definite system of examination will make the net close enough to avoid the escape of some. I would suggest, however, that a better plan would be to make the examinations every day for a period of over a month and that freedom could only be declared with absence of the organisms for from seven to ten days. A first criticism in relation to this is the work it would involve and the difficulty of finding men to undertake it, but I do not think the difficulty is so great as it seems. The examination is a bit of routine work involving very little knowledge and one competent bacteriologist with a staff of men and women, or even boys with a very short training could undertake a very large number of examinations per day, if the work were properly organized. To take an example, in one Command 2,360 enteric and dysentery convalescents were examined between January, 1916, and June, 1917, and of these only seventy-nine showed dysentery, typhoid or paratyphoid organisms—and this is the highest percentage of infected cases I have seen recorded for convalescents. We thus

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get an average of less than 4 per cent. of infective cases. To me it seems an easy task with this proportion of positive cases for a comparatively small staff to undertake for diagnosis purposes 200 to 300 examinations per day, and with proper organization it ought to be easy to limit the examination in any one laboratory to much smaller numbers. But supposing the difficulties are great, surely an attempt to overcome them is worth while if the value of such a systematic examination is established. I have not been able to get statistics in regard to bacillary dysentery but in a table given by Dobell in regard to amœbic dysentery over a period of fourteen weeks—one examination per week over a period of three weeks might show a negative result in a definitely positive case—even two, three and four examinations per week might lead to the same result but a daily examination showed a positive result at least once every week. Rajchman and Western say in regard to bacillary dysentery three, or better four, examinations at weekly intervals constitute the irreducible minimum, since 20 per cent. of pathogenic bacteria discovered were found in the third examination. The very fact that they suggest a fourth as an irreducible minimum is, I think, sufficient indication that they consider that cases may escape who have only four examinations. When we recognize that the carrier may set up a new centre and produce further carriers, surely a thoroughly exhaustive examination is needed and the appointment of a sufficient Staff to undertake such examinations is a thoroughly justifiable procedure.

In conclusion, let me very briefly summarize :—

(1) In dealing with infective diseases one of the greatest problems is the carrier.

(2) The organism in the carrier is most often found in the pharynx, nasopharynx, nose or intestine.

(3) It is therefore of the utmost importance to disinfect the upper respiratory passages not only during epidemic but as regularly as one cleans the teeth, and in the intestinal diseases to see that all the dejecta are thoroughly disinfected, and where possible in carriers to wash out the bowel with some antiseptic of known value.

(4) That convalescent enteric and dysentery carriers should receive special instructions, such as those detailed in the pamphlet issued by Davies and Walker Hall.

(5) That all public, school and institutional lavatories should be

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flushed with a thoroughly reliable disinfectant after use by each individual.

(6) That the examination of carriers should be much more thorough and exhaustive than at present. In intestinal disorders there should be daily examinations for one month, and at least freedom from bacteria for at least seven to ten days.

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[2] SEMPLE and GREIG. Scient. Mem. by Officers of the Medical and Sanitary Department of the Government of India, No. 32, Calcutta, 1908.

[3] PRIGGE. "Studien über Typhusbazillenträger," *Klin. Jahbr.*, Bd. xxii, p. 245, 1909.

[4] DEAN, &c. *Journ. Roy. Army Med. Corps*, 1917, vol. xxviii, p. 428.

[5] LIVERPOOL TROPICAL SCHOOL. Reports upon Investigations in the United Kingdom of Dysentery Cases received from the Eastern Mediterranean, Medical Research Committee, No. 5, Part 3, 1918.

[6] BASSETT-SMITH. "Bacteriological Studies in the Pathology and Preventive Control of Cerebrospinal Fever among the Forces during 1915 and 1916." Report of Medical Research Committee, 1917, p. 66.

[7] NIVEN. Report of the City of Manchester for 1908, p. 53.

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[10] MAYER, G. *Cent. f. Bakt.*, Abt. I, Orig. Bd. liii, p. 234, 1910.

[11] DOBELL. "Amœbic Dysentery," &c., Medical Research Committee, 33, Report Series No. 4, 1917.

[12] NEWSHOLME. Further Reports on Cerebrospinal Fever, 1917.

THE ROYAL INSTITUTE OF PUBLIC HEALTH.

The Council are pleased to report that H.R.H. The Prince of Wales, K.G., has accepted the office of Vice-Patron.

The following telegram was sent to H.M. The Queen, on the occasion of her birthday, May 26, 1919.

"The Queen,
Buckingham Palace.

The President and Council of The Royal Institute of Public Health send most respectful and cordial greetings to Her Majesty, their Patroness, with their heartfelt good wishes."

To which the following reply was received:—

Buckingham Palace,
May 26, 1919.

"The President, The Royal Institute of Public Health,
37, Russell Square, W.C.1.

I am commanded by the Queen to express to you and to the Fellows of The Royal Institute of Public Health, Her Majesty's very sincere thanks for the good wishes on the occasion of Her Majesty's birthday. HARRY VERNEY.

The following telegram was sent to H.R.H. The Prince of Wales, K.G., on the occasion of his birthday, June 23, 1919.

"The Prince of Wales, Buckingham Palace.

The President and Fellows of The Royal Institute of Public Health send their respectful and cordial greetings to your Royal Highness, their Vice-Patron, with their best wishes for your happiness.

To which the following reply was received:—

Buckingham Palace,
June 24, 1919.

The Prince of Wales desires me to thank the President and Fellows of The Royal Institute of Public Health, of which His Royal Highness is Vice-Patron, for their kind congratulations on the occasion of his birthday.

GREVILLE, Comptroller.

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THE SOCIAL ASPECT OF THE PROBLEM OF THE CONSUMPTIVE IN RELATION TO A COMPREHENSIVE SCHEME.

BY

NOEL D. BARDSWELL, M.V.O., M.D., F.R.C.P.

Medical Adviser, Insurance Committee for the County of London.

A Lecture delivered at The Royal Institute of Public Health.

(*Concluded from p.* 187.)

Housing.—I have considered the social life of the consumptive mainly from its financial aspect; incidentally, however, I have touched on two other closely associated factors, housing and employment. Both of these play a large part in the lack of success which attends our efforts to cure tuberculosis.

Several of the life histories I have quoted instance the difficulties which arise on these heads. They have brought out the fact that there are scarcely any avenues of suitable employment open to a large number of patients who are capable of work and of ultimate recovery, and that for want of other means of gaining a livelihood many resume work under conditions which must result inevitably in the speedy loss of the benefit conferred by treatment in a sanatorium.

With respect of housing; another factor, the importance of which cannot be exaggerated. When one bears in mind the needs of the tuberculous in regard to air, and reflects that throughout England and Wales one out of eight families live in dwellings comprising one or two rooms, the significance of the housing question to the treatment of tuberculosis can readily be appreciated. The fact that tuberculosis officers classify the home conditions of patients in their areas on the basis of the number of persons who share the same room or the same bed with the invalid is an indication of the gravity of the handicap arising from overcrowding. There is no need to labour this fact. I will but cite one case as an example of what the consumptive and those who would help him often have to contend against: Miss C., aged 18; a case of somewhat advanced consumption. Home conditions described by her doctor as follows: The family, which consists of the parents

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and seven children, share a fairly small house with three other families. The patient's family possess one fair-sized bedroom with two windows, one of which opens about 2 in. at the bottom; a very small and dark back bedroom, dirty, dilapidated and stuffy, having one window and containing a dirty double bed; and a very small kitchen with a smaller scullery leading from it; the latter has a window overlooking a yard, but it is blocked by a chair to prevent the children falling out. The whole family of nine occupy the larger bedroom, the patient sharing a bed with three other children; the youngest child is a baby of 14 months. An intimate friend of the patient's, who lived on the flat below, recently died of pulmonary tuberculosis.

The late King asked, apropos of tuberculosis—"If curable, why not cure? If preventable, why not prevented?" While conditions as those just described continue to exist the answer is not difficult to find.

My remarks so far have not perhaps been in a particularly cheerful strain; however, there is a reverse to the medal. For since we know that the failure of sanatorium treatment by no means lies entirely at the door of the sanatorium, but rests rather with our faulty system of home treatment, or, as it is usually termed, after-care, the lines for further effort are clearly defined. The failure of home treatment implies no reflection upon the work of practitioners and tuberculosis officers, but for whose labours matters would be much more unsatisfactory than they are. But the medical profession are handicapped by conditions inherent in the life of the working classes which paralyse their efforts. As a patient said to me recently, "I cannot earn a penny. How can I get better on advice and bottles of medicine? I want more to eat." No appreciable progress is possible until the social side of the problem is seriously dealt with. It is not too much to say that the treatment of tuberculosis, other than in institutions, lies primarily in the domain of the social worker. This truth finds expression in the element which constitutes the brighter side of my subject, namely, the steady development of "After-care." It is the rôle of after-care agencies to render the social circumstances of patients such that medical science can give effective assistance. After-care work is many-sided; grants in money or in kind in aid of families suddenly bereft of the wage-earner, and to those who, as the result of prolonged illness, are reduced to living on a pittance which spells

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semi-starvation, the renting of a room, or more commonly the gift of a bed for the use of the consumptive when overcrowding renders any degree of segregation an impossibility, the canvassing of employers with a view to finding employment which shall be within the capacity of a tuberculous patient, and subsidizing of this work should it not give the worker a living wage. In default of experience many after-care committees can do little more than set in motion the machinery of private benevolence or official relief. In London one of the first steps is to mobilize the activities of the C.O.S., a body to whom the tuberculous poor are greatly indebted. To judge by my experience it is voluntary effort and philanthropy that carry the greater part of the burden of the treatment of the tuberculous working classes. I except of course patients in residence in a sanatorium or in Poor Law institutions. The following, for instance, is a familiar course of events : Mr. W., a packer, aged 30, married, has a wife and three young children to support. Has been found to be suffering from consumption in its early stages; prospects of complete recovery are favourable granted prompt treatment. Offered a bed at a sanatorium, he refused it on the grounds of difficulty at home. Inquiry proved the stumbling-block to be the usual question of the support of dependants. Referred to the C.O.S.; the necessary assistance was at once forthcoming and the patient left home for the sanatorium without anxiety. A type of report coming from patients in this group which is disquietingly common at the present time is represented by the following: A. R., a discharged soldier, recently discharged from a sanatorium. The tuberculosis officer reports "he does not seem up to doing any serious work and certainly is not so well as when he left the sanatorium. He should do all right with light occupation in the country; can anything be done?" This man has a wife, and one child, aged 9; his income consists of a pension of 32s. a week, which, after payment for rent allows him 27s. per week for the support of himself, his wife and his child. The family live in one room; the house is in a court in a poor neighbourhood; and their circumstances are indicative of poverty. Satisfactory progress of the patient cannot be expected.

If, as there is reason to believe, London is representative of the country generally, there are thousands of men invalided from the Services on account of tuberculosis, who, unable to find employment suited to their particular requirements, are living upon

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pensions which, in many instances, are inadequate for the maintenance of themselves and their families.

One has only to compare the experiences of patients resident in areas in which an active after-care organization is in being with those in districts in which this essential unit is actually or practically non-existent, to appreciate the valuable services rendered by a well-organized unit dealing with social conditions. Dr. Meek, of Frimley, has recently published some striking evidence on this point from the records of the Lady Almoner's Department of the Brompton Hospital.

The duties of an after-care officer are highly skilled. As in other walks in life, efficiency can come only from sound training; a thorough knowledge of social science is essential. For success, every patient must be the subject of individual study. As Miss Bompas, of Brompton Hospital, once said to me: "The whole future of a patient may turn on the discovery of a half-forgotten uncle, who, on being approached, offers to a young consumptive shop assistant a home and suitable employment in some rural district." Personal assistance of this character requires time, patience, knowledge, money, and infinite tact. I would like to see centres established for the training of after-care workers. They could be realized to-day in the Almoner's Department of some of our leading hospitals. The social worker should be adequately paid, be a whole-time officer, and free from routine clerical work. After-care committees, however, are greatly handicapped by lack of means. Many of their most effective measures entail expense which voluntary contributions, generous as they may be, cannot fully meet. There is a call for their greater official recognition and encouragement, and for assistance from the public purse. At the present time there exists a considerable amount of experience and enthusiasm in connection with the social side of the tuberculosis problem which but needs a strong lead and direction.

By some means the economic difficulties I have referred to must be met; these remedied, amelioration in other directions would follow automatically. It should not be impossible to devise a scheme of more generous scale of sickness benefit. I am convinced that by sensibly relieving much hardship which now is unavoidable, an increased sickness benefit would justify higher rates of contribution from all parties concerned. One would like to see also some means of official assistance other than that of the

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Poor Law for what is termed the deserving poor. It is often stated that there exists no dislike to seek relief of the Poor Law, nor, indeed, any cause for reluctance to do so. My experience is that the self-respecting man or woman will make any sacrifice to maintain his independence. Many social workers inform me that they rarely make appeal to the Guardians, since in their experience it results merely in an offer to remove the patient to the workhouse infirmary or of outdoor assistance which is altogether inadequate.

The quality of the Poor Law relief varies greatly in various boroughs; exceptionally it is conceived on generous lines.

Occupation.—With respect to occupation: obviously there is a limit to what after-care committees can achieve in light, but sufficiently remunerative work for consumptives. The unfit cannot compete successfully with the sound in the open market. Herein lies the obstacle to vocational re-education except for the few, unless provision is made for the subsequent employment of the newly trained. I can see no solution but that work be specially organized for consumptives as a necessary part of their home treatment. There should be conveniently situated centres at which patients could work to the limits of their physical capacity and subject to medical supervision. The wage should be equal to the fair needs of the worker, irrespective of what he actually performs. The difference could be made up by the earnings of other members of the family, or by a special type of sickness benefit on the lines of Dr. Varrier-Jones' scheme for Cambridgeshire. The principle of subsidizing part-time labour is on trial in several places, but it is a measure which necessitates greater funds than voluntary effort can find. The establishment of special workshops and occupations for consumptives could not be realized without the sympathy and co-operation of trade unions. Objection on the score of competition with sound labour might be met by the special centres supplying exclusively the needs of local authorities and institutions under their care, and not serving the general trade. Doubtless trade unions would recognize that it is infinitely better to encourage work even on a modest scale than to perpetuate idleness. It is true that work centres would not meet the difficulty of bad housing. It may be said that the advantage of suitable work under good conditions and the promise of a fair wage would be useless if at night the patient returned to an overcrowded and insanitary dwelling. When this objection is valid, the housing also must be

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attended to. In Paris there are dwellings in connection with the dispensary at which consumptives, failing other means, can obtain proper accommodation. Similar hostels exist also in America. In this country it is difficult for tuberculous patients to obtain accommodation on account of the fear of infection; the provision of hostels in each borough is worth serious consideration. It may be urged that these various suggestions would be useless in practice owing to the prejudice of the patients themselves and their dislike to advertising themselves as suffering from tuberculosis. I feel sure that given the facilities, prejudice would give way before appreciation; everything must have a beginning.

Several of the life histories I have given refer to the common solution of economic stress arising from the loss of the wage earner, namely, the taking up of the burden of maintenance by the patient's wife, and how this leads to the risk of neglect of home and children. The provision of crèches and day nurseries on the lines of those established for the children of women employed in munition factories would do something to remedy this particular evil; at the same time, the continued absence from home of the mother of the family is a measure which can be accepted only as an undesirable makeshift.

Colonies.—Colonies are urged by many as the solution of the tuberculosis problem. The usually accepted idea of a colony is an institution which shall admit a few of the most favourable cases with a view to completing their cure, and to some extent teaching them a new occupation. A colony of this description constitutes a valuable means of giving prolonged sanatorium treatment at a relatively low cost, and should be a unit in any comprehensive anti-tuberculosis scheme. But institutions of this character could deal but with a fraction of the large mass of the tuberculous population.

A more comprehensive colony scheme is conceived by Professor Sims Woodhead and Dr. Varrier-Jones, among others, namely, one which would offer the means of permanent settlement. It is not designed for the compulsory segregation of patients, but as one which, by providing healthy homes, skilled supervision, and opportunity for remunerative work alike for sick and sound, the patient and his relations, would secure the integrity of the family unit, and thus encourage a voluntary migration. If, as is probable, all the households in a settlement were not completely self-

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supporting, any subsidy granted should be regarded as a price paid for securing segregation of an infectious person, and it would be a good bargain. An objection to a general segregation of tuberculous persons in colonies is the break-up of family life which such a measure would entail.

Self-contained villages for the disabled in the War will shortly exist; that they will pave the way for some similar provision for the tuberculous is, I think, certain. The experience gained in these villages will be invaluable, although the problems of the disabled from injury and the disabled from disease are not identical.

Homes for Advanced Cases.—Homes for cases suffering from advanced tuberculosis of a character which shall attract these unfortunate people are a pressing need. They must be really homes, and not institutions, in the sense that the working classes employ this term.

I have had time but to sketch briefly this big subject. I have purposely not referred to the all-important question of prevention. If we may trust to all we read nowadays, the future will see sweeping reforms which will make for a lessening of the incidence of tuberculosis; better conditions of work and better houses, more equitable distribution of profits, revised hours of labour, and some degree of equalization of rich and poor in respect of the amenities of life; in short, greater appreciation that the good health of the worker is the best asset of the employer and of the State. This is all to the good. Still, the millennium is not yet; the day is far off when tuberculosis will be a spent force. In the meantime, therefore, while pressing forward with measures calculated to check the spread of tuberculosis, we must not lose sight of the individual consumptive, but, with no less purpose, persevere to find means to brighten his outlook.

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Chemical Notes.

BY
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The Estimation of the approximate quantity of Meat in Sausages and Pastes (Geo. Stubbs, F.I.C., and A. More, A.R.C.S., *Analyst*, 44, p. 125).—Owing to the Meat Rationing Order, 1918, No. 404, maximum prices are fixed for uncooked sausages which must not contain less than certain fixed percentages of meat. It has therefore become necessary to estimate approximately the percentage of meat in sausages and the authors have devised the following method which is in use at the Government Laboratory. Beef, mutton and pork do not contain carbohydrate nor crude cellulose and the average percentage of nitrogen, calculated on the fat-free meat is 3·75 for beef and mutton and 4·0 in pork. The "fillers" usually consist of bread, but cooked rice, potatoes and maize meal are now frequently employed in addition. The fillers usually contain about 40 per cent. of water when ready for mixing, about 50 per cent. of carbohydrate and crude cellulose, and 1 per cent. of nitrogen. *Analysis:* The meat is removed from the skins and thoroughly mixed by passing it at least twice through a mincing machine. (1) *Water:* 5 grm. are weighed into a flat porcelain dish containing a glass rod and about 20 grm. of calcined sand; mix thoroughly and dry at 100° C. to constant weight. (2) *Fat and Non-fatty Solids:* Five grm. are weighed into a flat dish containing a glass rod with flattened end. Dry on the water bath for thirty minutes and rub down with rod at intervals. Macerate with ether until fat is extracted, the ethereal solution being filtered through a dried weighed filter-paper, which is finally washed free from fat. The residue in the dish plus that retained on the paper, when dried gives the non-fatty solids. (3) *Fat:* This is obtained by evaporating the ethereal solution, drying and weighing: 100 − percentage of (f. + s.n.f.) = water percentage which should agree with the direct estimation. (4) *Nitrogen* is determined by the Kjeldahl process. (5) *Ash* in the usual manner. (6) Boric acid, salt, sulphites and other preservatives are tested for and estimated if present. *Calculation* (*a*). The percentage of s.n.f. minus the sum of proteins and ash gives the amount of carbohydrate and crude cellulose. If this amount is multiplied by two the approximate percentage of bread and cereal filler containing 40 per cent. of its weight of water is obtained. (*b*) 1 per cent. of the "filler" is taken as the nitrogen due to the "filler." If this quantity is deducted from the total nitrogen, the remainder is due to the meat. To obtain the percentage of defatted meat, the meat nitrogen is multiplied by $\frac{100}{3·75}$ for beef or mutton or by $\frac{100}{4}$ for pork, or by $\frac{100}{3·87}$ for mixed meats. (*c*) The total percentage of meat in the sample = percentage fat + percentage defatted meat obtained under (*b*). (*d*) The difference between

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100 and the sum of the percentages of "filler" and total meat gives the additional water, i.e., other than natural to the meat and present in the "filler."

The Determination of free carbon in Rubber Goods (A. H. Smith and S. W. Epstein, *Journ. Indust. Engin. and Chem.*, vol. xi., p. 30).—Free carbon is usually added to rubber goods in the form of lampblack and the following method is proposed by the authors. Extract 1 grm. of the sample for six hours with acetone and then with chloroform or carbon bisulphide for three hours. Transfer the sample to a 250 c.c. beaker and heat on the water bath until the solvent is evaporated. Add a few c.c. of hot conc. HNO_3 and allow to digest for about ten minutes. Add a further 50 c.c. of the hot acid, washing down the sides of the beaker. Heat on the water bath for about an hour. Pour the hot liquid into a weighed Gooch crucible with ignited asbestos. Filter and wash with hot nitric acid. Reject filtrate and wash filter alternately with acetone and benzine until a colourless filtrate is obtained. Now wash with hot 15 per cent. NaOH and follow with warm ammonium acetate so as to test for lead by means of potassium chromate. If it is found to be present eliminate it by further washings of ammonium acetate. Treat the precipitate with 5 per cent. HCl, and dry in the air-oven at 150° C. Weigh, ignite and re-weigh. The difference in weight represents 105 per cent. of the carbon originally present as lampblack.

Lead in Pharmaceutical Zinc Oxide (W. D. Collins and W. F. Clarke, *Journ. Indust. and Engin. Chem.*, vol. ii., p. 138).—The authors found in their experiments that samples might contain as much as 0·05 per cent. Pb and fail to respond to the test for heavy metals as given in the United States Pharmacopœia. They recommend the following method as being more sensitive. From 5 to 40 grm. are suspended in water and sulphuric acid is added until dissolution is effected and the acid is in slight excess. The volume is usually about 100 c.c. for 10 grm. of ZnO. Alcohol (95 per cent.) is now added just short of that necessary to commence the precipitation of the zinc sulphate. It usually requires about one-third of the volume. Allow to stand overnight; filter off the lead sulphate on an asbestos filter. Wash with 50 per cent. alcohol and then dissolve in ammonium acetate. Acidify with acetic acid and add potassium chromate. Allow to settle overnight and filter off the lead chromate on a weighed Gooch crucible with asbestos. Dry at 110° C. and weigh. $PbCrO_4 \times 0{\cdot}6397 = Pb$.

British Pharmacopœia, 1914. *Cancellation of Alterations and Amendments* (W. Partridge, *Analyst*, 44, p. 137).—The Executive Committee of the General Council of Medical Education and Registration decided that the temporary alterations in the P.B. caused by the scarcity during the war of sugar, glycerine, and certain oils and fats, should be withdrawn as from April 30, 1919. Lard is now permitted in the making of ointments.

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Estimation of Theobromine in Synthetic Drugs (W. O. Emery and G. C. Spencer. *Journ. Indust. and Engin. Chem.*, vol. x, No. 8, p. 605).—The authors have devised a method for estimating theobromine in certain diuretic combinations of theobromine and theophylline, notably with sodium acetate and salicylate. The method consists in forming the hydriodo-tetriodide and titrating the excess of standard iodine added. In a small 50 c.c. conical flask, with lip, dissolve 0·1 grm. of the sample (with about the molecular equivalent of sodium acetate, in the case of theobromine alone) in 2 c.c. of glacial acetic acid, warming gently on a gauze. Dilute with 3 to 5 c.c. of hot water, transfer the quite clear solution to a 100 c.c. graduated stoppered flask, containing 50 c.c. of $\frac{N}{10}$ iodine, using warm water for rinsing. Add 20 c.c. of saturated NaCl solution and 2 c.c. of conc. HCl whilst rotating the flask. Insert the stopper and allow to stand over night. Make up to bulk with water and mix well. Filter through a 5·5 cm. filter, reject the first 15 c.c., and collect 50 c.c. in a graduated flask. Transfer into a 250 c.c. conical flask, rinse out, and titrate the excess of iodine with $\frac{N}{10}$ sodium thiosulphate. The real number of cubic centimetres of the iodine × 0·0045026 = theobromine. The periodide has the formula $C_7H_8N_4O_2.HI.I_4$.

The Evaluation of Hexamethylene Tetramine Tablets (W. O. Emery and C. D. Wright. *Journ. Indust. and Engin. Chem.*, vol. x, No. 8, p. 606).—Urotropine and its compounds in tablet or other form are widely used for diuretic purposes, and a process has been devised for estimating the active principle. On hydrolysis, urotropine is converted into formaldehyde and ammonia. When an aqueous solution of formaldehyde is treated with alkalized potassium, mercuric iodide, the former is converted into a formate and separation of colloidal mercury. *Reagents Required:* (1) Modified Nessler solution; (*a*) 10 grm. $HgCl_2$, 30 grm. KI, and 5 grm. acacia, dissolved in 200 c.c. of water and filtered through a plug of cotton wool; (*b*) 15 grm. NaOH in 100 c.c. water. (2) $\frac{N}{10}$ iodine; (3) $\frac{N}{20}$ sodium thiosulphate. Determine the weight of twenty or more tablets, powder in a mortar, and keep in stoppered bottle. Weigh out 0·5 grm. of the powdered sample, transfer with sufficient water to a flask, and add water, to a total volume of 100 c.c. and 25 c.c. of 10 per cent. HCl. Connect with a reflex condenser and boil gently for fifteen minutes. When cold wash out condenser tube with a little water, and transfer contents of flask to a 250 c.c. graduated flask and make up to bulk. Pipette 10 c.c. into a 200 c.c. conical flask containing 20 c.c. of (1) *a* and 10 c.c. of (1) *b* solutions, and allow to stand for a few minutes after gentle rotation. Add 10 c.c. of 40 per cent. acetic acid, mix quickly with gentle rotation and immediately run in from a burette 20 c.c. of $\frac{N}{10}$ iodine and titrate with $\frac{N}{20}$ thiosulphate to starch. The end point is a pale straw-green. One cubic centimetre of $\frac{N}{10}$ iodine = 0·001167 grm. of hexamethylene-tetramine.

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Reviews.

Books for Students of Public Health.

Text-Book of Public Health. By Professor E. W. Hope, O.B.E., M.D., D.Sc. Pp. 267. Price 7s. *Manual of Hygiene for Students and Nurses.* By Professor John Glaister, M.D., D.P.H. Pp. 403. Price 6s. *Public Health.* Catechism Series. By W. Robertson, M.D., D.P.H. Parts 1-5. Price 7s. 6d. *Handbook of Public Health.* By John Orr, M.D., F.R.C.P. Pp. 236. Price 2s. *Chemistry.* Part I. Inorganic. Pp. 74. Price 1s. 6d.; Part II., Inorganic and Organic. Pp. 73. Price 1s. 6d. Catechism Series. Publishers: E. and S. Livingstone, 17, Teviot Place, Edinburgh.

Professor Hope has compiled his *Text-Book of Public Health* (late Husband's) in order to meet the requirements of the medical student and for those studying for the Diploma in Public Health. The increasing scope and importance of preventive medicine have led the author to give in a concise manner the essential parts relating to the subject; the information is given in a useful and practical way. There are twelve chapters and over fifty illustrations. Students reading for the Diploma in Public Health will certainly find this book of much service to them, as it is written by an acknowledged authority on the subject.

An excellent *Manual of Hygiene* has been written by Prof. Glaister for students and nurses. No one can doubt the ever-increasing importance of a knowledge of personal and general hygiene, and this book will be found of much use by the public and by those engaged in dealing with disease. A knowledge of the laws of health is required of the student of medicine and of the nurse, as well as of the physician and surgeon. Nobody can remain ignorant of the main principles of hygiene and preventive medicine with impunity. This work is copiously illustrated and contains in a simple manner a large amount of important information on matters concerned with personal and public health.

The aim of Dr. John Orr in his *Handbook of Public Health* has been to describe in a concise manner those matters relating to public health with which medical students should be equipped for their future duties as medical practitioners. The author has admirably succeeded in his object; in the first five chapters he deals with soil, air, water supplies, disposal of excreta and refuse, cemeteries and crematoria. The remaining five chapters are devoted to dwellings, communicable diseases, food, vital statistics, and climate. This work has many good points and although it is quite elementary it contains all that medical men require and is clearly written and intelligently arranged.

Public Health by Dr. W. Robertson has been written in the form of question and answer. This is an excellent way of helping students preparing for examinations because possible questions are suggested which they might not otherwise have conceived. We recommend this book particularly to those studying for the Diploma in Public Health. They will find it very helpful for their examinations The first two parts deal with water examination, air, ventilation, warming, lighting. Part II is devoted to sewage and its treatment. The remaining two parts contain much information on vital statistics, dwellings, meteorology, epidemiology, food, disinfectants, hospitals, &c.

The previous book, together with *Chemistry, Inorganic and Organic*, issued in two parts, belong to what the publishers term their catechism series. They present a bird's-eye view of the subject enabling students to memorize more easily. These catechisms are arranged systematically by men who know their subject and their use familiarizes students with the form in which they are examined both orally and in written papers. They do not intend to be text-books; they are to aid the memory of the student in retaining the facts given by lecturers. These are two excellent little books and they give a comprehensive and condensed review of the subject of chemistry, and the essential points are emphasized.

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The National League for Health, Maternity and Child Welfare. Annual Report for 1918.

Some interesting information is contained in this Annual Report which has recently been issued. The League constitutes a link between the many voluntary national organizations concerned in safeguarding the health of the nation and more especially of mothers and young children. The League has, within less than a year, co-ordinated seven bodies--a very creditable achievement. Each of these now forms a section with its own clearly defined functions and has its own Executive Committee. Amongst the many activities of the League we notice that it was entrusted in last July by the American Red Cross Society with the administration of a fund amounting to £15,000 with which to promote the welfare of mothers and babies in the United Kingdom. In this way maternity hostels at Liverpool, Swansea, Coatbridge, Dublin, and Bermondsey benefited. A Babies' Emergency Home has been established at Clissold Park and provision will be made for a greater number of ante-natal clinics in London and the Provinces.

Notes on Meat and Food Inspection for Sanitary Inspectors. By John T. Cowderoy. London, 1918: The Sanitary Publishing Company. Second Edition. Pp. 76. Price 2s. 6d.

In publishing the second edition of this little book, the author has taken the opportunity to thoroughly revise its contents, and he has made such additions as were necessary to bring the information up to date. It is intended for inspectors in the smaller provincial towns. The subject matter is arranged in a very concise and practical manner, and the bold headings render it easy to find the desired information at a moment's notice. This is an excellent little manual, is practical, and will prove a welcome friend to meat inspectors in their duties.

Transactions and the Seventh Annual Report of the London Dermatological Society. London, 1919: John Bale, Sons and Danielsson, Ltd. Pp. 90. Price 2s. 6d.

This report contains the papers and discussions contributed to the London Dermatological Society during the session 1917-18. There were eight papers and they make interesting reading for dermatologists and those interested in skin diseases. There is also an excellent address by Dr. Leonard Williams on "The Real Dermatology."

Mental Diseases. By Walter V. Gulick, M.D. St. Louis, 1918: The C. V. Mosby Co. London: Henry Kimpton. Pp. 142. Price $1.00.

There is a natural want for concise and accurate information and the author feeling this demand has written this excellent little manual which physicians in court or conducting office or public examinations of the insane will find very acceptable. The medical profession will also find it serviceable when unexpectedly called upon for diagnosis in private practice. The forms of mental disease mentioned follow modern usage. The first chapter gives the classification now accepted for use in the War Department and recommended for general adoption in the United States. The writer describes those disorders first, which are most frequent and the others are distributed in suitable chapters, of which there are seventeen altogether and thirty-six good illustrations. This is a handy guide to the obscure subject of mental diseases.

Hæmatologists' Aid to Memory. By Henry H. Scott, M.D., D.P.H. London, 1918: John Bale, Sons and Danielsson, Ltd. Price 5s.

This is an excellent chart for hæmatologists, measuring 28 by 33 in. Much useful information is condensed into tabular form. The name, size, shape and cytoplasm of the phlogocytes, also the myeloic, lymphoid and red cell series are given. Blood pictures of diagnostic significance are described and there are helpful notes, memoranda and a glossary.

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AFTER-WAR SOCIAL RECONSTRUCTION.

BY

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A Lecture delivered at The Royal Institute of Public Health.

THERE is not the least doubt that prior to the War the great nations were apparently being drawn into closer touch and fellowship with each other. There was the semblance as if the Brotherhood of Nations was about to dawn and towards that event international conferences in Medicine, Science and Art were believed to be contributing. Much of the movement, however, must have been on the surface only, for now that we look back upon these years with wider knowledge of the concealed intention and misleading actions of Germany, our confidence in the integrity and honour of that country has been rudely shaken, our faith in the Brotherhood of Man considerably weakened, and this not only through the action of our enemies, but by circumstances which are happening at home. However much we deplore War and its awful consequences, the recent conflict will not have been an unmixed evil to mankind if it removes national and social wrongs, gives to small nations the right to develop on lines of their own and to individuals the freedom which springs from submission to law, discipline, and adhesion to order. No nation and no section of a nation can be, any more than an individual, a law to itself. We have seen the fate which has deservedly overtaken a people who arrogated to themselves the power to ignore and to subordinate national rights and international laws to their own aims. Aspiration is laudable so long as the object sought is improvement, but it is shorn of its higher function when in trying to gain advantages the aspirant intentionally injures others or deprives them of their legitimate rights. What was aspiration thus becomes avarice with its attendant evils.

It is disappointing, for the moment, that while the war has been won largely through the united action of the Allies, by individual sacrifices, and by our soldiers submitting to authoritative guidance, now that the men are returning to civil life, discipline in many instances is being thrown aside, and men and labour

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sections are regarding things only as they concern themselves, unthinkingly ignoring the fact, that all sections are interblended with each other, and that since wealth cannot be artificially created but is the outcome of the productivity of all classes, so is it impossible without a corresponding increase of output to meet the demands for higher wages and improved methods of living. Never, than at the present, has there been a greater need for unity among all classes, if we are to secure the fruits of victory. Sectional wages cannot be raised without a rise all round, for all classes must participate in the benefit, if benefit there be. There is no wish on the part of the authorities, nor is it desirable, that the power to strike should be forbidden, for, under certain circumstances, it is a weapon which when wielded wisely may become a power for good, yet wielded unwisely may bring untold suffering. All mass-meeting and down-tool strikes however should be stopped since this decision is too frequently come to by the subjection of reason to feeling. Before a strike can be put into force there ought to be a careful inquiry and a few weeks should elapse before, under any circumstances, such a severe method should be adopted.

The masses are discontented partly because of the abnormal life and labour conditions of the last few years, the sudden subsidence of mental tension, the industrial dislocation consequent upon the suspension of hostilities and such facts of which the following may be taken as an illustration, viz., skilled mechanics, *e.g.*, pattern makers of many years' training receiving £4 a week as war wages, while men who, until the war, had never been inside a factory, were given machine jobs with wages ranging from £7 to £8 per week. There is not the least doubt that the squandering of money by persons in Government employment is the cause of some of the trouble to-day. It is impossible for any country to maintain for long the high wages which during the last four years have been so lavishly distributed; £2 and more per week to lads of 15 to 16 years of age; £4 to £5 to untrained munition workers, and similar sums all round, have created a taste for wealth and the spending of it which normal conditions cannot maintain. A kind of intoxication, not confined to one class of society, has passed over the country, the awaking from which renders its victims resentful of interference. And yet, say what we will, we must all return, sooner or later, to a healthier and saner condition of things. Through demobilization, hundreds of thousands of men are pouring

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back again into civil life. Many of these men have had their views of life changed by their experience at the Front. They are seeking employment which is not always available, a circumstance rendered all the more difficult, owing to the present strained relations between labour and capital.

The question of social reconstruction so far as we are concerned has reference to—

(1) The men who stayed at home.

(2) The men who are coming, or who have come, home from the Front.

(3) The men who are coming home broken in health, and totally or partially, disabled for work owing to the wounds they have received.

(4) The present and the future of the womanhood of the country.

There is a feeling, whether supported by facts or not, that much of the labour unrest is the outcome of the restlessness and dissatisfaction of men who have not shared the dangers of War, but have enjoyed the privileges offered by working in protected trades and thereby of earning inflated wages. No one denies to them the gains which war-labour brought within their grasp, but these highly paid workers can hardly expect that the excessive taxation of the country is to be maintained in order that they may continue to receive war wages, or, for more than a limited period, unemployment benefit. There has never been in this country a wider spread or more sincere desire to help the working classes to obtain better wages, to improve their conditions generally, and to give them opportunities of rising by education to a higher station of life than there is to-day, but these objects can only be attained not by one section of the community arrogating to itself the position of dictator, but by the Nation acting as a whole. A Nation is a corporate body, and, just as in an individual all members of the body do not share equally, yet all receive their proper share of sustenance commensurate with the function they have to perform, some more, others less, so in society there must be unevenness of distribution due to the character of the work done and the physical fitness for it. There will always be social inequalities, to the production of which natural causes such as ill-health, loss of limb, and death of the breadwinner of a family contribute. These are not all of man's creation, nor are they within his control, and yet much

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can be done to lessen these inequalities and to brighten the lives of the people generally. Utopia, however, is not yet in sight, nor is there any short cut to it by most of the untried schemes which are before the world to-day. There is a limit beyond which high wages cannot be pushed, and more particularly is this the case when at the present the country is living largely on borrowed capital and trade has not revived. The expenses of war have drained the Exchequer. The country has, in one sense, no immediate reserves, although it has resources. It rather looks at the rate we are spending money as if the twentieth century was to become the spendthrift of the nineteenth. The wages demanded by some sections of labour may be such that a particular industry cannot support the claim, especially if there is a diminution of output. It would be safer in many instances for small employers to close their works altogether than attempt to compete with larger firms with stronger finances, who would thus, not only drive out of competition the smaller employer, but, as the larger firms could continue to pay the higher wages, they would in order to recoup themselves ultimately raise the price of the products far beyond previous value. Carry this all round and society generally would suffer, since there are many people with inelastic incomes who would be unable to rise to such contingencies, but, more than that, labour itself would be unconsciously playing into the hands of capitalism.

Under the present industrial unrest there is something deeper than appears on the surface. It is the expression of a sense of wrong which labour feels it has suffered from for decades of years. It is a longing for freedom and opportunity, the rights of labour to a larger share of profits. Since labour contributes to profit-making, its claim cannot be altogether ignored. Labour, however, is only entitled to its share. The higher wages demanded are only in some instances a pretext for such greater requests as the right to all the profits, and that if this is unobtainable from such employers as colliery owners, railway and transport companies, then these concerns must be nationalized for the benefit of labour. The cry for nationalization has caught on, and is really the concealed but dominating thought which has taken hold of the leaders of the working classes, and for which they are pressing as if a change from the private employer to the State would bring the Elysium desired. Personally, I have no objection to the nationalization of

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means of transport, but I have not yet become a convert to the nationalization of production, and to the State competing as a producer with the private employer. Our experience of State control of enterprises during the war has been anything but satisfactory. As I have as much objection to the State becoming sole employer as I have to the absolutism of private ownership, I think a solution of present labour difficulties might, at any rate for the present, be found in the co-operation of State supervision, private enterprise and labour representation. Physical labour is not the sole energizing factor in production, there must be the directing mind, and without capital both are shorn of opportunity.

Hours of Work and Fatigue.

There is not the least doubt that modern industrial operations have given rise to a type of fatigue peculiar to the work of to-day. It is partly due to the intensive nature of the work, to its monotony and to strain. The poor food of the last four years did not improve matters. It would be of great assistance if we could ascertain the number of hours that work could be carried on for each of the important industries with that sense of well-being to the individual which healthy labour creates, and beyond which work falls off, owing to the development of fatigue of which the worker may or may not be conscious. It is admitted that the effort to stir up tired muscle and a jaded nervous system to maintain the pace is a cause of accidents in factories, and that if the particular number of hours which could be comfortably worked could be ascertained, beyond which labour loses its productive value, it would be to the advantage alike of the employer and to the worker himself. There is nothing to be gained by driving the tired worker beyond what he has power to accomplish; fatigue work is unprofitable work. This was strikingly demonstrated in the long hours, the overtime and the Sunday labour which the exigencies of war created, along with a shortage of labour, and which resulted in the breakdown in health of many of the workers. Several men have come under my care who for two years worked overtime, including Sundays and one whole night (usually Friday) once a week, with the result that not only did the men become the victims of fatigue, which obliged them to desist working for a day or two, now and then, but as a consequence of the prolonged strain and its attendant loss of sleep they have since broken down in their nervous system. For two

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years these men worked eighty to ninety hours a week, often doing their work badly, simply because they had not strength to do it. Is it any wonder that some of the labour sections should to-day be going to the other extreme, like the miners, and demanding a thirty hours week, and other trades forty-two hours? There must be a happy medium in this question of hours of work. As we have seen something of the evil effects of overwork, so we must not allow the cry of fatigue to carry us too far to the other extreme. The subject of fatigue is a complicated one, for in it is involved not only the fact of overwork itself, but the necessity of getting rid of the waste products from the body by sleeping in airy rooms amid quiet surroundings, also the ability to obtain proper food, hence the demand to-day for larger wages and improved housing accommodation for the working classes.

It is the opinion of Trade Unionism that the labour market runs the risk of becoming overstocked, and that every trade can only employ a certain number of people. Hence the desire of Trade Unionism to limit the number of apprentices and to reduce the number of hours of work. There can be no reasonable objection to the reduction of the number of hours of work, so long as the day, for example, is divided into four shifts of six hours, instead of three of eight hours, and the output is maintained. Let us guard the health of the worker by all means, especially in intensive occupations and dangerous trades, but from the industrial point of view let there be no falling away of production, rather an increase of it, since by that means only can employers have the wherewithal to pay larger wages. Lord Leverhulme has suggested a two-shift day of six hours, on the ground that it is as easy for the machinery of a factory to be run twelve hours instead of eight, also that the working classes would thereby have the leisure they are asking for. War work, and the employment of women in some of the departments of skilled trades, have shown that previous to the war men were not producing the maximum, for some of the women who took their places were found, after a few months training, to be turning out, not only as good material, but a larger amount of it than did the men. In circumstances such as these, there was no question of fatigue, for the women did not complain of being overtired, it was rather the unwillingness on the part of the men to produce the maximum. No one, and least of all a physician, can advocate long hours of work in the principal occupations, for the work is of an

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intensive nature and involves a considerable amount of strain. On the other hand, the cry of fatigue can be easily raised, and as all occupations are not equally fatiguing for the same number of hours worked, the shifts must vary for certain trades. The adoption of the same number of hours cannot be of general application. Before resorting to a diminution of hours of work all round, the health statistics and the mortality rates of the various industries should be compared, and deductions drawn from facts and experience as to their effects upon health and longevity. There is, or there could be placed before the country at the present time, sufficient evidence to show that, by the reduction of one hour per day in the shifts in some industries, production has not suffered, and consequently that the men have been entitled to the same wages, although working five hours less per week. As already stated, it is not so much an objection to the lessened hours of work, as a necessity for the prosperity of the country that output shall not be diminished.

Return of Healthy Men from the Front.

To all men who went at the call of duty or of conscription to the Front, and to whom it was stated that their places would be kept open for them on their return, employers must keep faith as far as they possibly can. Men, still in the Army, are rightly or wrongly irritated by the slowness with which they are being demobilized, while others who have come home are equally disappointed in not finding work. Upwards of one and a half millions of men have been liberated and it could hardly be otherwise than that among such a large number there would be many malcontents. Four years spent in the war have not only unsettled many of the soldiers but given them a dislike for the work they previously followed, while the younger men who were passed into the Army from the schools and universities and who had not embarked upon their life's career have lost four of the most valuable years of their life. They have come home only to find that few appointments are open to them, and that if they earnestly desire work they must accept subordinate positions. To commence at the lowest rung of the ladder is doubtless a necessary and proper procedure, but as several of these men occupied positions of command in the Army, it is irksome, to say the least of it, to be placed in positions of a subordinate nature. To some extent, this is unavoidable and time will doubtless rearrange things, for men will find their level and

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be given the posts to which their diligence, talents and adherence to duty entitle them. One of the difficulties is that the men who stayed at home and who have worked themselves into positions are hardly likely to relinquish these to men who have returned from the Front. The State cannot interpose more than insist that employers carry out their promises. It is asking too much from men who gave up their income and their prospects in life on joining the Army, to make fresh sacrifices on restarting life, since these cannot but inflict hardships upon the families and of necessity must postpone the realization of their ambitions.

Return of the Disabled Soldier.

The Workmen's Compensation Act is applicable to the Government as well as to civil employers of labour. Of all forms of labour active military service is the most dangerous, for to the perils of war are added illness incidental to campaigning. For wounds received in war a soldier is justly entitled to compensation, but in many instances the pensions granted are quite inadequate, and would not be tolerated of employers in a court of law, had similar injuries been received by men in civil occupations. What sustenance can a widow purchase with the 7s. to 10s. allowed to a wounded only son who was her main support, and who, through wounds received in war, is no longer able to support her? It became evident early in the war that many of the disabled soldiers who were coming home would on account of their wounds never be able to return to their previous occupation. Steps were taken to train such men for other trades. The State undertook the task of providing training, but, ere this was well on the way, private enterprise had not been behind in providing facilities for the practical instruction of these men. In one of my early visits to the Western Front I was impressed by what France was doing to recuperate the wounded soldier, and to make him once more a productive member of society. On my return to Newcastle, with the assistance of Colonel Joseph Reed and Colonel Sir Johnstone Wallace, we were able through the gift of £2,000 from Miss Jane Cowen of Stella Hall, Blaydon—daughter of the late Mr. Joseph Cowen, M.P. for Newcastle-upon-Tyne—to establish a Home (The Joseph and Jane Cowen Home), wherein upwards of 300 disabled soldiers have been housed and trained in various employments. Seventy-five per cent. of these men are now making a living wage,

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and are once again active and contented members of society. We had difficulty in getting the men at first to come into the Home as they were under the impression, that if they learned a trade and began to earn an income, the amount of their pension would be diminished. When the Ministry of Pensions clearly made it known that the amount of the pension would be regulated by the amount of disablement and the previous earnings of the disabled soldier, the men came forward in larger numbers, many of them entering with alacrity and a spirit of enthusiasm into the training which was being provided for them. It may not be known to the country generally that it was at the Cowen Home, of which I happen to be chairman, that the King's Fund was inaugurated to provide financial aid to disabled soldiers who, after a period of training, wished to commence business on their own account. It arose thus: Mr. John Hodge—then Minister of Pensions—came down to Newcastle to publicly declare the Home open, after we had been running it for over a year. One of the men, whom we had successfully trained in boot making and boot repairing, had intimated to the Committee of the Home that he wished to commence business in a small way as a boot repairer. We were prepared to assist him with a small grant, but, as Mr. Hodge was coming to open the Home, we thought it was a good opportunity for the inmates of the Home to place before Mr. Hodge their wishes and their opinions as to the future of the trained disabled soldier. Mr. Hodge met the men and discussed the problems with them, with the result that, while he had no funds out of which he could immediately make a grant, he would advance £20 for the purpose of starting the individual in question in business, and that he would appeal to the public for money to enable trained disabled soldiers to commence a new career. That fund became the King's Fund, a fund which has been most helpful to many a disabled soldier who has undergone training for a new occupation. As a Committee we had undertaken to give to each man on leaving the Cowen Home, after a satisfactory training, a bonus of 5s. a week—or in other words £13 for the year. After the Pension Minister's visit the Ministry indicated that the men should have an extra four months' training in civil workshops away from the Cowen Home, and that, if after the extra training they were found to be capable and reliable workmen, they would be entitled to apply for £25 from the King's Fund in order to set them up in a boot repairing or

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other establishment. As the number of disabled soldiers kept increasing and fresh occupations had to be sought for the men, labour societies drew our attention to the fact that as men were being turned out, only after a few months' intensive training, there was the danger of the labour market in certain specified trades becoming overstocked, and that in order to prevent this, it was desirable to bring the training of the men more into line with trade union requirements by lengthening the period of training to twelve months or more. We had, therefore, to restrict the number of men who were being turned out as fairly efficient workmen after six to nine months' training and detain them longer in the Home. Advisory Committees had meanwhile been set up and upon them fell the burden of indicating the conditions under which the disabled soldiers should be trained and of arranging for their training. Recently the training of the disabled soldier, for better or for worse, has passed from the Ministry of Pensions to the Ministry of Labour.

The object before the country is to train all disabled soldiers who are otherwise physically fit and who wish to learn a trade, so that they can add to their income. Whether this should be done on present lines which are partly State, and partly voluntary, or whether State factories should be established for the men, are problems that still await solution. Speaking from my own experience, disabled men, who are keen and who are interested in their work, can after six or eight months' training repair and make excellent boots, others who were better educated before joining the Army can in a similar period become skilful and reliable electricians, while there are others again who, no matter the kind of work they are being trained in, never put their soul and energy into what they are doing, so that it is not altogether a question of eight, ten or twelve months' training, but one of the aptitude of the men to learn and the character of the training which is given. It is not maintained that a soldier, thus intensively trained, is in all respects equal to a healthy man who has served a long apprenticeship, the physical disability of the wounded man makes it in many instances impossible for such to be the case, but from a social point of view the question is, is the disabled soldier thus capable of doing a fair day's work, of earning a sufficient livelihood and of becoming a productive and useful member of society? The needs of society, and the claims of the soldier who has been disabled by war, are the

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impelling motives, and not the requirements of this or that trade society. The men in order to support themselves and their families must work, unless they are to remain permanent pensioners of the State. It is our duty therefore to recognize and to see that they are paid for the amount of work they are capable of doing. The problem of the disabled soldier who is obliged to take up a new occupation is something different from the training of a healthy youth with his occupational career before him, and for which he is qualifying by a long period of apprenticeship. The trained disabled soldier can hardly ever become such an all-round man as the apprenticed artizan. The point is, can he be useful and reasonably productive in his new occupation up to a certain point? If so, let both employers and Trade Unionism give him and the cause a trial.

In disabled soldiers are reflected all that is best and all that is worst in men generally. The war has not altered their disposition. Many of them, it is true, are not keen to commence work, but in fairness to the men it ought to be said that, for a considerable time after their recovery from their wounds and their long residence in a hospital, many of them have neither the physical strength nor fitness for heavy work, nor would they be able straightaway to put in the number of hours of work required. It is therefore necessary that the disabled soldier should be well fed and that his training should be gradual. The present allowance of 27s. 6d. given by the Pensions Office to men when undergoing training, in addition to the provision made for the wives and children has enabled the men to follow up their training with greater contentment, and therefore with greater eagerness, since the introduction of the improved scale of allowances. Now and again a disabled soldier, whose defect was not in any way disqualifying him for the work he had chosen, has had his pension immediately reduced by 5s. a week, because a Medical Board had intimated to him that he must undergo a fresh surgical operation in order to further diminish the physical defect so as to avoid the possible risk of injury through exposure when at work. I refer especially to wounds of the head, where a portion of the cranium is absent. While the recommendation is made for the good of the soldier, Local Pensions Committees should hardly act at once upon the recommendation by reducing the man's allowance. The disabled soldier has the right to think over the matter, and, if he wishes it, he should be allowed the opportunity of submitting his case to a board of hospital surgeons other than the medical board

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which made the recommendation. The patient should also be given some assurance that, in the event of his condition being made worse by the operation, his pension will be raised.

The *demobilization of women, the future of the womanhood of the country and of the children* are subjects also calling for consideration. The eagerness and the earnestness with which women in the early years of the war replaced the man-power in our factories have convinced most people that, in many occupations, they have proved themselves to have been excellent substitutes, and that neither the character of the work, nor the amount of material produced, suffered at the hands of the new army of workers. Previous to the war there was an immense amount of female labour in the country which, although available, was not being utilized through lack of opportunity. To many women life lacked attractiveness. There was little scope for the exercise of their ability, and as a consequence discontent was inevitable. Meanwhile a change had been creeping over the social life and customs of the country which heralded the era of women's emancipation and usefulness, and for the realization of which the war created the opportunity. A million and a half of women have been demobilized. What is to be done with them? A large percentage of them cannot return to their homes, for many of these have gone; nor will all of the women who were previously in domestic service return to it, since they have been handling larger wages, and have enjoyed the independence which munition work gave them, nor will textile workers all return to the cotton and other factories. The girls who took up work on the land like it, and most of them will adhere to it. What is to be done with the 300,000 female civil war-workers and those who have gone into banking and commercial concerns? The Restoration Bill about to be introduced into Parliament will be of some assistance in helping to solve the problem of the future employment of women. Is the training which the women have received to go for nothing, or, if it is to be utilized, then how? I am one of those who maintain that woman's place primarily are the home and the family, but since there are tens of thousands of women to whom the making of a home and the bearing of children are likely to be denied, and to whom, in order to have a livelihood, work will be a necessity, opportunities will have to be created whereby their claim of the right to live by offer of service shall be recognized and met. Since the women came forward at a time

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when the safety of the nation was imperilled, a fairly large percentage ought to be allowed to continue in their employment, or occupation be found for them. No employer, State or civil, can utilize in the hour of dire necessity labour which confers a favour, and then ruthlessly throw it aside when the immediate need has passed away. In speaking thus for the recognition of women, we cannot ignore the claims of the men, since upon them falls the burden of family maintenance. They, too, gave up much for their country, and their wives and children have suffered in patience. On leaving for the Front, promises were made to them which must be fulfilled. The times are grave: they call not only for patience, since things cannot be rearranged all at once, but also for the suppression of selfishness and the mutual recognition of the rights of others. Since time will not permit of me dealing with reconstruction as affecting the medical profession, I feel that the last words of this address should be given to the subject of the effect of war-work upon women and the future of womanhood.

If the immediate finding of employment for thousands of demobilized women is a difficult problem, not less important from a national health point of view are the effects which the long hours and the recent hard labour are likely to have, if any, upon the future motherhood of the country. As medical inspector of large explosives works which gave employment to thousands of women during the war, I was frequently brought into contact with female workers whose daily routine in many instances was something like the following: Called at 4.30 a.m. so as to have an early breakfast, if possible, and thereafter to catch a train which would enable them to reach the factory not later than 7 a.m. where they worked, with stated intervals for food and rest, until 7 p.m., home would not be reached until 8 p.m., or even later, according to the distance of their homes from Newcastle, when, after a meal, and thoroughly played out, they sought refuge in sleep. In the final report upon the health of munition workers, Dr. Janet Campbell has drawn attention to the fact that many women had performed heavy work hitherto regarded as fit only for men. In several of the factories the work was on the two shift system of twelve hours each. In the factories for which I was medically responsible, the day and night shifts alternated weekly. Dr. Campbell has expressed the opinion that the shifts were too long and that they ought to have been eight hours. It should be remembered that these shifts

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were worked by women who were not too well nourished, as at the time there was a scarcity of food in the country. In fact, it was pitiable to see the poverty of the contents of many of the dinner baskets, and how impossible it was for the women upon their scanty fare to meet the physical strain which the work imposed upon them. Dr. Campbell states that in an analysis which was made in eight factories, 40 per cent. of the women were found to be suffering from fatigue and that, probably, this was an under-estimate. She also states that the character of the work did not always explain the fatigue, for as two-fifths of the women were married and had young children, and half of them were doing fairly heavy house work in the evening, the tiredness could hardly all have been due to their employment in munition factories. It is only proper in view of our experience of the bad effects of the hard labour which women experienced in the chain trade in the "Black Country" a few years ago, that women should not be given work beyond their strength. On the other hand the war has shown that there are certain occupations for which women were previously regarded as unfit but for which they have shown themselves not only fit but also that instead of suffering have improved in health and physique through it. There is a knack in lifting and carrying heavy weights which women soon acquire, but, notwithstanding this, the fact remains that only young women of strong physique should be called upon to undertake this kind of work. It is well known that the lifting of heavy weights may induce displacement of their pelvic organs and that this may mar their comfort ever afterwards. Sufficient time has not yet elapsed for us to know definitely whether overstrain at war work has prejudicially affected the health of the women and in any way interfered with their capability to bear and rear healthy children. It is a truism that a nation's greatest asset are its children. If, therefore, as a consequence of anything which has taken place during the last four years the birth-rate of the country should decline, then clearly the State will be obliged to make provision whereby the well-behaved poorer working classes will be assisted in the upbringing of their children. This can be done by the grant of "maternity aid." Already National Insurance has made provision for the expectant mother both during and after her confinement. It is necessary now, more than ever, to save the children. Germany has already been tackling the problem of increasing the number and of improving the quality

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of her population. As far back as a year ago it was a recommendation to the German legislative bodies that a fund should be raised by contributions from each family supplemented by aid from the State, a fund to which each female on reaching the age of sixteen should also contribute and continue to do so until she had passed the child-bearing age. The relief given was to be regulated by the income of the breadwinner and the size of the family. No relief was to be given where the income was over £120 a year. Unmarried women were not to be excluded from receiving benefit. In addition, all girls between the ages of 14 and 18 were to be compelled to attend courses of instruction in household management and domestic economy. In our own country an attempt of some kind will have to be made to bring the income of wage-earners into a more definite relation with the size of the family and as this can hardly be undertaken by employers, and the scheme may not receive the support of Trade Unionism, it must be undertaken by the State. The principle has already been conceded in the mode of payment of allowances to the wives and dependents of soldiers when the men were in the Army. Now that a military peace is likely to be assured, and already 787,000 men have returned to civil employment, with more to follow, it is not desirable that women with a family should be encouraged to work and leave their home. The wages should be sufficient to obviate this necessity, but it is not always a necessity, for as Dr. Elizabeth Sloan Chessar in her interesting book "Women, Marriage and Motherhood" states married women's employment in factories is not the result of poverty; nor even when poverty is the plea, are the wages of the mother an actual gain to the family. By the daily absence of the mother from home much is lost to the children, since it is the want of maternal attention to them in the early months of life that makes or mars their future. War-wages tempted women to work when the price of commodities was high, and unmarried girls who handled these high wages have become more independent and are hardly likely on their own initiative to renounce them for the quietude and monotony of home life and the responsibility of motherhood upon a meagre income. There is thus the danger of a decline of the birth-rate which the country will have to face but which to some extent can be met by the institution of mothers' pensions. This country has already done much for the family by financially assisting women at their

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confinement, by indicating how through the instruction given by Mothers' and Babies' Welcome Societies, children's lives may be saved, by free education, and the provision, where necessary, of free breakfasts to the poorest children attending school. It is but one step further to endow motherhood itself and if this is done for the wives of our working men there will also have to be made ampler medical and hospital provision for the industrial classes generally. The present hospital accommodation in our large towns is not adequate: the long waiting lists must disappear. A bread-winner who goes down through illness, attributed to the nature of his employment and incidental to it, or who meets with an accident at work is the servant of the State, and as he is a contributor to the wealth of the Nation, it is desirable, with the State safeguarded, that he should be restored to health and to his family as early as possible.

THE ROYAL INSTITUTE OF PUBLIC HEALTH.

THE Council, recognizing the urgent necessity which now exists for obtaining an Endowment Fund for the Institute to enable it to worthily maintain its position in view of the formation of The Ministry of Health, and to meet the greatly increased cost for the adequate remuneration of its Laboratories' Staff, THE JOURNAL OF STATE MEDICINE and general maintenance expenses, are making an appeal for Funds, which appeal was unanimously endorsed at the Mansion House Meeting in London under the Presidency of The Lord Mayor, *vide* p. 252.

The following donations have already been received :—

His Majesty The King	£100
H.R.H. The Prince of Wales	10
H.M. King Manuel, K.G.	10
Lord Leverhulme (conditionally on £50,000 being raised)	1,000
The Prudential Assurance Co.	250
Sir John Ellerman, Bart.	105
Sir Robert Kindersley, K.B.E.	105
Sir Samuel Waring, Bart.	52
Brigadier-General M. H. G. Fell, R.A.F.	2
Mrs. Wharrie, Annual Subscription	250

The Council earnestly appeal to the Fellows and Members of the Institute to assist them in their endeavours by the exercise of such influence as they are able.

E. W. HOPE,
T. N. KELYNACK,
Hon. Secretaries.

July 17, 1919.

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THE WAR-TIME EXPERIENCE OF FACTORY MEDICAL OFFICERS AND THE POSITION OF FACTORY MEDICINE UNDER PEACE CONDITIONS.

BY

W. J. O'DONOVAN, M.D., M.R.C.P.

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Chief Medical Officer, Ministry of Munitions.

A Lecture delivered at The Royal Institute of Public Health.

FACTORY medicine did not begin with the war in 1914, but its opportunities were so unique during the existence of the munitions industry and its activities were so extended and its result so fruitful that some record of the scope of its activities it is hoped may be of public service.

Reference must first be made to the immense help that factory medicine received during the war from the policy and work of Viscount Chetwynd, the Managing Director of Chilwell National Shell Filling Factory. His was the pioneer effort of putting medical officers on the managerial staff of his own immense factory, and so setting an example that was widely followed throughout the country. For good industrial work the factory medical officer must have a high factory status, together with executive responsibility and the whole-hearted support of his management, and Chilwell provided the example, quoted everywhere, of the immediate and continued benefit of a factory medical staff. With 9,000 employees there were two whole-time doctors and two part-time, one factory dentist and four trained nurses, and this staff was none too large to conserve the health of the thousands there employed in filling shells with poisonous explosives.

Certifying Factory Surgeons were first appointed by Act of Parliament in 1833, and in the Home Office Factory Department are three medical inspectors visiting factories and correlating the work of these surgeons; these three medical inspectors at the outbreak of war were practically the only men with a full knowledge of the state of industrial medicine in this country. New factories for the manufacture of munitions of war were rapidly established

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and staffed, and thousands of men and women were hurriedly taken on for work involving countless new and old risks to limb, life and health without any corresponding increase in industrial medical personnel. The need of a munition medical service became acute when T.N.T. began to be handled in large quantities; large numbers of workers began to fall ill and deaths were becoming unpleasantly frequent, when on the nomination of Dr. Legge, His Majesty's Senior Medical Inspector of Factories, I was appointed a Medical Adviser, later Chief Medical Officer, in the Ministry of Munitions.

Immediate steps were taken to appoint medical officers to all factories handling poisonous explosives, instructions as to duties were issued, all available knowledge was distributed, information and suggestions were circulated between factories and factory doctors, and a code of T.N.T. regulations was finally issued by the T.N.T. Committee (Chairman Sir Walter Fletcher) that embodied the experience and practice of the best factories. The effect of this has been related elsewhere (*Proceedings Royal Society of Medicine*, "Epidemiology of T.N.T.," July, 1918), and forms a notable chapter in the history of preventive medicine.

Throughout this period of strenuous exertion one clear and fundamental idea became more and more insistent, and that was that *maintenance of health far outweighed in importance the early detection and treatment of industrial disease.* This view, however, has not yet found acceptance by the public at large. Industrial poisoning is notifiable, and every effort has to be made to keep down such illness within the narrowest possible limits, but in concentrating energy into this one field of industrial disease the larger general view of the maintenance of industrial health is lost sight of. Colds, sore throats, pneumonia, tuberculosis, rheumatism and heart failure take a heavy toll off factory efficiency, add heavily to the groanings of industrial discontent, shorten the working life long before industrial efficiency should have reached its limit, yet this field is untilled and such energy as there is available is concentrated on a few diseases of dramatic symptomatology but, viewed in perspective, of comparatively rare incidence. The public outlook on industrial medicine is largely bounded by the Workmen's Compensation Act of 1906, the medical referee of an insurance company is the common conception of the industrial physician, and this outlook tends to tinge the factory workers' view of industrial medicine with a definite bias of distrust. It is certainly no duty of medical

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referees to promote industrial health. With regard to young workers the certifying factory surgeon stands at the factory gates and all " young persons " (below 16) must be first passed by him into factory life, and this is a great safeguard against admitting the unfit into occupations that might aggravate their disability.

The concentrated experience of war time in munitions has conclusively shown that the following duties must appertain to a factory medical officer.

In the first instance the factory doctor stands at the door of employment and his initial duty is to decide what sort of occupation the many candidates who present themselves are really fit for. His duty is not to cast away but to adapt physique to occupation. During the war, owing to the urgent claims of active service, those left for factory life were often fit subjects for medical demonstration, yet owing to the scarcity of male labour every possible use had to be made of the available supply, and thanks to the discrimination of the factory doctors, many who would be condemned to unemployment in the consulting room found steady and often curative or remedial occupation in some branch of industry suited to their disability.[1] When every process of an industry is known and its physiological demand has been assessed, not by introspection but by actual intimate medical knowledge of factory life, the percentage of really unemployable is very much minimized. Secondly, but not of less importance, the factory doctor must regularly inspect the workshops to advise the management on matters that call for improvement, such as poor lighting, drainage, ventilation, and so on. Local housing conditions, transit to and from work, the actual starting and stopping times of work are all points with an important medical aspect, and medical work in this direction is bound to result in increased factory efficiency. The public call for factory welfare, when analysed, is a call for expert industrial medicine.

Without the gates the factory doctor is a buffer, or a link as occasion requires, between the management and government inspectors, the medical officer of health, the infectious disease hospital, the general hospital, panel practitioners and even the coroner: without expert help and advice under these headings the

[1] In one factory ten per cent. of the men were fitted with trusses by the factory doctor.

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reputation of a factory may easily suffer, or individual cases go without timely and adequate medical assistance.

In the diagnosis of disease or disability due to industrial life no ordinary consultant can hope to come into competition with a wide-awake Factory Medical Officer. In a so-called poisonous trade such as filling shells with T.N.T. some 6,000 operatives on one site may be called T.N.T. workers, yet half of these may be free from all contact with this material. Some will be railway workers, others engineers, some doorkeepers, others will handle empty shells and others filled shells with ½ in. of steel between themselves and the poisonous contents, yet all when ill may present themselves to their doctors as cases of T.N.T. sickness, and it is only the doctor versed in factory processes and the details of individual occupation who can properly and safely assess the nature and cause of many of such disablement claims. Even in hazardous occupations in which systematic poisoning may develop, much illness attributed to unhealthy employment may in part be due purely to fatigue; drink and the devil are factors causing illness even in poisonous trades. "Days off" for vague pains and aches long before demonstrable disease is present may be, and often are, indications not of the effect of absorbed poisons but of long hours, discomfort at work or too little sleep.

The importance of this workshop study of industrial fatigue cannot be overestimated; the happiest results achieved in the Ministry of Munitions were due to the actual work of its medical officers on the factory plants, and amongst and with the factory operatives. Before the war our knowledge of industrial diseases as a whole depended on the reports of visiting medical inspectors, the benefits of resident inspectors have now been experienced for the first time, and it is not too much to say that real progress in the knowledge of industrial health and disease will depend on the employment or non-employment of this new instrument. Under the Ministry of Munitions the medical service existed to help the factory management, not to visit and condemn: the medical officers of the Ministry were responsible for the factory conditions, were part of an organized whole, and when difficulties arose they worked in the factory among the staff and operators until the cause of the trouble was established with some solid probability, and the remedial measures advised were such as factory experience had shown to be practicable and acceptable to both

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management and workers, and not likely to hamper the very reason of the factory's existence, namely, output.

A medical aspect of strikes is here worthy of record. In one factory the fulminate of mercury workers struck, saying that they were being poisoned by their work and adducing many symptoms in proof. In conjunction with the factory doctor I advised the manager that this poisoning was non-existent, and an increase of ½d. an hour would remove all symptoms—and so it did. At another factory much unrest culminated in a strike; from this factory I had seen in a short time a dozen men seeking discharge during a critical period of the war owing to ill-health. I could find no physical signs of disease, but when told that they had worked ten to fourteen hours daily for eighteen or more months one had little doubt that unrest and fatigue were synonymous terms. One factory employing women was brought within measurable distance of a strike owing to the zeal of a newly appointed medical officer. A medical survey of all, including the old employees, was undertaken as soon as the doctor had got into her stride, and some were registered as physically unfitted, although they had six to eighteen months of strenuous labour to their credit. My services were called in as an arbitrator. In every case there was some lesion or physical sign to which objection might have been taken by an examining doctor, and had the rejection been made when employment was sought, no trouble would have arisen; fortified by their experience in the work these rejected workers sought the help of their own doctors and obtained certificates as to their fitness for employment. In this case I had no hesitation in accepting the results of these human experiments as opposed to consulting room opinion, and a full explanation to those finally rejected that it was mainly in their own interests, settled the matter to the satisfaction of the Trade Union officials. The one lesson to be learned from this incident is, however, that provision must always be made for a second independent opinion when so important a matter as the livelihood of a worker is at stake, nothing could be more likely to bring our profession into unfriendly relations with the workers' organizations than the refusal of employment on any appreciable scale by the junior members of our profession without ample safeguards for review in doubtful or disputed cases.

One weighty reason why so little influence is exercised by medicine upon public affairs lies in the individualist outlook that permeates it

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through and through. The broad outlook of lawyer and priest is lacking largely because we are so concerned with the individual sick man, and health and humanity in the mass seldom present themselves as subjects for our study, yet since the greater part of our vast adult population finds its present or future entwined with industry it will be nothing less than calamitous if one great lesson of the war is lost and medicine and industry become again divorced. Rewards for industrial medicine are practically non-existent, the work that is done by the few pioneers of to-day will be indicated by this extract from the Fifteenth Annual Report of the Chief Inspectors of Factories for 1913 :—

February, 1913.

"Dr. Collis[2] has been much occupied with special inquiries. On two occasions he gave evidence before the Royal Commission on metalliferous mines and quarries; on the first his evidence concerned the effects of dust upon granite cutters in Aberdeen, and the special relation of silica dust to the occurrence of phthisis; and on the second he presented statistics to show that silica dust produces an excessive mortality from phthisis among stonemasons. At the desire of the chairman he also made special inquiries at places where road metal and granite sets are prepared in the Midlands and into mortality among ganister workers. Following upon the publication of a report on Dupuytren's contraction of which he was joint author with Mr. Eatock, he gave evidence before the Departmental Committee on Industrial Diseases, accompanied the Committee to Nottingham on a visit of inspection, and at their request carried out a further inquiry in the south of Scotland. As member of the committees appointed to consider the use of lead in paint in the house and coach painting industries much of his time has been devoted to this subject. Consideration of objections raised to the amended draft regulations for bronzing, which have since been accepted and became operative on June 1, entailed his attendance with Mr. Sydney Smith at conferences with employers. A report in which he collaborated with Mr. Hilditch, on the conditions of employment in the manufacture of tin plates has been published, and contains suggestions for improving these conditions. He conducted an inquiry into an outbreak of unusual illness accompanied by asthma and persistent cough among weavers in

[2] Now Professor of Preventive Medicine in Cardiff.

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Lancashire, a report upon which has been separately published. In connection with an inquiry which he is conducting with Mr. Sydney Smith into the effects of dust upon those employed in grinding metals in those industries not affected by the Regulations for grinding of metals, he has carried out investigations in the districts in which those processes are chiefly met with. He commenced an inquiry in the principal boot centres into the conditions giving rise to phthisis among those employed in the manufacture of boots and shoes; and during inquiries into mortality among stonemasons, he was present at a conference in Aberdeen at which occupiers and operatives were represented. In the early part of the year he paid many visits to cotton mills to ensure the completion of installations for removal of dust generated in the processes of stripping and grinding cotton carding machines. These installations are proving so successful that men who had previously been compelled to give up this work are now returning to it, and the example set by Lancashire in this matter is already being followed in spinning mills in other countries. He also visited factories in various parts of the country in connection with the observance of the regulations for lead smelting, vitreous enamelling, casting of brass, heading of yarn and tinning."

All this from one man working not in conjunction with professional colleagues with diverse interests, watching students and laboratory help, but almost alone—a truly marvellous output, but how wrong it is that parallel inquiries are not always afoot correcting results and opening up new fields of study.

When the sickness and deaths from T.N.T. bid fair to stop the output of shells far-reaching preventive measures had to be rapidly instituted to cope with this menace, and these measures had perforce to be based on analogy; one did not know for certain the paths of absorption and hence a wide frontal attack had to be made where with further knowledge a more rapid and effective onslaught might have been made on T.N.T. illness. In effect our measures were successful and rapidly so, but what anxiety would have been spared, interference with structures and factory processes lessened and what a saving would have been effected for the public purse had there been in existence an industrial medical service capable at any time of rapid expansion, including laboratory and post-mortem workers and a medical directorate charged not with routine inspection duties but with the duty of looking ahead and pre-

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paring against the dangers that arise in the changing complexities of factory life and processes, and which with the new vistas open before technical science must always involve new hazards for the workers. Deaths and coroners' inquests must not be looked upon as normal warnings of industrial dangers, but must be avoided by the prevision of the industrial physician.

The Medical Headquarters Staff to-day at the Home Office is restricted in scope by the Factory Acts and is understaffed to a degree that hampers its utility; the peripheral staff working daily in the industrial field is equally hampered. The definite duties of the Certifying Factory Surgeon are few, his opportunities for factory study are far too limited and his remuneration is wholly indefensible. He examines children (under 16) and certifies their fitness or refuses to admit them to industrial life entirely or with reservations. He is told to take their height and weight and use a stethoscope, he must take into account the sanitary conditions, lighting, temperature and ventilation of the work people; he holds the child's future in his hands and the State estimates the value of his duties at sixpence per person examined.

Industrial deaths offer a large field for special work almost entirely neglected. Post-mortems, unless done by a man constantly engaged in such work, are apt to result in very misleading conclusions being drawn as to the causes of industrial ill-health. The forms of blood disease, anæmic or hæmorrhagic, the asphyxias and heart failures of industry need most skilled and patient pathological elucidation. Should a murder occur the Home Office uses the best pathological service it can obtain; should an industrial death occur a busy practitioner has to leave his work and do the *sectio cadaveris* under difficulties. The drama of murder secures the best of medicine, but the deaths of industry are governed by a far less active policy. The factory doctor cannot work alone; like his bedside brother, he needs the help of the factory dentist and factory nurse. In small factories and in those where minor accidents are the sole casualties, a factory nurse holds a position of great responsibility; she has no matron, often no colleague to consult, the doctor's visits are periodic and between them problems of life, of infectious disease, of early illness and grave accidents come upon her. She must be fully trained, supported by the consciousness that she is not practising a lower branch of her profession and "welfare work" in factory life must be

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so arranged as to give scope to her interests and to bring into this newer effort the traditions of service, accuracy and loyalty, and that intimate and unofficial attitude towards the poorer workers that nurses and doctors acquire in their hospital days and never lose.

Thanks largely to the organization of Sir George Newman, registered dentists and school children are brought together, to the elimination of the quack, in their early years. In industry however the hours of the dentist and worker never coincide. Unless a worker is prepared to lose time he must seek the service of some potentially dangerous quack in the evening hours. The importance of a healthy mouth in preventive medicine cannot be overestimated. *Factory dentists* were introduced on a comparatively large scale by the Ministry of Munitions; extractions under gas or local anæsthesia and scalings by the dentist or his trained nurse were done on a stupendous scale, yet nothing now remains of this organization save its memory and example.

The call is growing up for practitioners skilled as industrial physicians and the medical schools should reflect this need. The etiological importance of industry as an overwhelming factor in adult disease is hardly appreciated by the best of medical students; rare blood diseases receive concentrated study, but industry, the life blood of Britain, is hardly studied or taught even to post-graduate students. A chair of industrial medicine free from the State but working in the closest touch with the State industrial medical services is the most pressing need in medicine to-day. The war has only intensified the need of continuous study of the conditions necessary to maintain health in industry. The clothing and feeding of workers, the lighting of workshops, the provision of dental and ophthalmic skill and surgical aid appliances in factory life are to-day dealt with largely by lay people and in an empirical manner. The study of fatigue and the significance of labour wastage, lost time and accident figures, all call for University help and guidance and yet until there is some scheme of professional lectures covering the physiological and clinical problems of industry and their administrative bearings, it is indeed hard to press the services of the medical profession upon the leaders of industry.

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APPENDIX.

(A suggested Clinic in Industrial Medicine.)

TWO COURSES OF TEN LECTURES.

(1) The environmental conditions of industry including the problems of industrial clothing, feeding, transit and hours.

(2) Industrial fatigue.

(3) The proper care of young people in industry.

(4) The industrial employment of single and married women and the health problems arising therefrom.

(5) The minimizing of industrial medical certification.

(6) The physiological principles underlying body temperature; the ventilation and heating of factory premises.

(7) A study of factory accidents, the lighting of factories, and factory first-aid.

(8) The prevention of the ill-effects of dust and fumes arising from factory processes.

(9) The prevention of industrial dermatoses.

(10) A review of the present state of industrial health legislation.

Second Series.

(1) The channels of absorption of industrial poisons with reference to physiological experiments and clinical studies.

(2) Industrial dermatoses due to oil, parasites, infection, and chemicals.

(3) Pulmonary disease due to noxious fumes and dust.

(4) Poisoning in the aniline industry.

(5) Lead poisoning.

(6) Occupational neuroses.

(7) The explosive industry and the ill-effects and diseases produced therein.

(8) Tuberculosis among the employed.

(9) The connection between strain, injury, and internal disease.

(10) The medical organization of industrial life and the duties of factory medical officers.

The first attempt to set up a clinic for industrial medicine must of necessity be experimental as the work is largely pioneer in character. The field that should be covered embraces laboratory experimental work, the visitation of type factories under skilled guidance, attendance at a clinic where a speciality is made of industrial diseases and accidents, and a course of lectures covering the maintenance of health in industrial life as well as a study of industrial diseases. Lectures upon the present state of factory legislation must be an integral part of the course.

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Laboratory Work.—Much importance is to be attached to this, inasmuch as unless a factory surgeon fully understands the way in which skin absorption can be proved, or the way in which noxious fumes are absorbed and act by inhalation, his work deteriorates by a lack of fundamental principles, so too there must be a thorough grounding in the physiology of body temperature and fatigue, in order that a sound opinion may be created on the question of open-air work, factory heating and the problems incidental to long hours and weight lifting. The factory work should include a visit to engineering works to study arrangements for fool proof first-aid, a visit to a chemical works where fume and skin absorption problems are met with in practice. Stone works and stone cutters must be seen to vizualize the origin of industrial pneumonoconiosis.

Library.—The lecturer should be in touch with all the Government Departments in this country, in America, and on the Continent, that deal with industrial diseases, so that publications dealing with industrial administration and research may be received and catalogued.

Museum.—A special effort should be made to gather together a museum of prints, photographs and pathological specimens illustrating dangerous and safe processes, factory first-aid dressings and appliances, models of direct and induced ventilation draughts, post-mortem and other specimens of preventable industrial diseases.

In the beginning perhaps the instruction and lectures might of necessity be given by one man, but the best results could only be obtained by a complete scheme embracing a lecturer with a whole-time assistant engaged in literary and laboratory research, and the lecturer shonld have power to invite single or more lectures by practitioners specially versed in these subjects. Attendance of the lectures would of course be open to men and women doctors, and in the certifying factory surgeons throughout the country and in school medical officers looking forward to more responsible work would lie the first field that should be canvassed for studentships.

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THE ROYAL INSTITUTE OF PUBLIC HEALTH.

LONDON CONFERENCES, 1919.

INAUGURAL MEETING.

June 25, 1919.

THE Inaugural Meeting was held in the Mansion House, London, at 3 p.m., The Right Hon. The Lord Mayor presiding.

Amongst those present were The Right Hon. The Lord Leverhulme, President of the Institute, H.M. King Manuel of Portugal, K.G., the Right Hon. Earl Beauchamp, K.G., The Right Hon. Viscount Knutsford, The Right Hon. Lord Blyth, The Right Hon. Lord Willoughby de Broke, The Lord Bishop of Birmingham, The Lord Bishop of Hereford, Lieutenant-General Sir John Goodwin, K.C.B., Director-General of the Army Medical Service, Surgeon Rear-Admiral Sir Robert Hill, K.C.B., Director-General Royal Naval Medical Service, the Dean of St. Paul's, Col. William R. Smith, Professor E. W. Hope, M.D., T. N. Kelynack, M.D., Mrs. Scharlieb, M.D., &c., and many others.

The following resolution was proposed by The Right Hon. the Lord Leverhulme, seconded by H.M. King Manuel, K.G., and unanimously carried:—

"That this Inaugural Meeting of the London Conference of The Royal Institute of Public Health having heard the statement presented by The Right Hon. The Lord Leverhulme, the President of the Institute, is of opinion that the Institute is eminently deserving of support and that steps should immediately be taken to place its work upon a sound and permanent basis, and, with the object of ensuring this, the Meeting is of opinion that it is desirable an appeal should at once be issued for adequate financial support, and that steps be taken to urge the claims of the Institute upon His Majesty's Government with the view of securing Treasury assistance."

CONFERENCE I.

ON "THE WORK OF THE MINISTRY OF HEALTH."

June 26, *at* 10 *a.m.*

The following resolutions were unanimously passed:—

(1) "That in the view of this Meeting Sanitary Inspectors, Health Visitors and similar classes of Public Health Officials should

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be adequately trained, and that the present system of examinations should be co-ordinated so as to secure one qualifying examination for the whole country."

(2) "That this Conference views with satisfaction the contemplated creation of Advisory Councils in connection with the work of the Ministry of Health, and urges that the services of those who have had long, wide and practical experience in administrative and executive Public Health work should be secured upon these Councils."

(3) "That in view of the large national demands which will be made on the Ministry of Health as an organizing and controlling centre it is desirable that it should not be burdened with functions of details which may result in depriving the local authorities of a sense of responsibility and a sense of initiative."

(4) "That in view of the invaluable services rendered by women who are serving as elected or co-opted members upon local authorities, or as officers of such authorities, this Conference is of opinion that women should be included in larger numbers on all advisory bodies, and that greater facilities be provided for the training of expert women workers in the homes of the people."

(5) "That this Conference respectfully invites all the smaller sanitary authorities, urban and rural, to consider the advantages which have already resulted from the combination of similar areas to secure the whole-time services of Medical Officers of Health and other sanitary officials, it being the opinion of the Conference that an adjustment of this character will result advantageously."

(6) "That in the opinion of this Conference all questions comprised within the scope of Port and Maritime Sanitation should receive the earnest attention of the Ministry of Health, and in order to ensure greater co-operation and confidence between British and Foreign Port Authorities the widening and readjustment of the agreements reached at the International Sanitary Convention are necessary."

(7) "That greater use should be made of the services of the British Consuls in foreign ports in obtaining and transmitting information relative to the sanitary conditions of the Ports."

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CONFERENCE II.

ON "THE PREVENTION AND ARREST OF VENEREAL DISEASE."

June 26, *at* 2.30 *p.m.*

The following resolution was unanimously passed :—

"That in the opinion of this Conference it is absolutely essential, alike from the military and civilian standpoint, as also from a consideration of the interests of women and children, that legislation affecting venereal disease should be amended and harmonized, so far as it possibly can be, with the legislation affecting other forms of communicable diseases, the aim being to ensure *continuity* of treatment and the prevention of the spread of infection."

CONFERENCE III.

ON "HOUSING IN RELATION TO NATIONAL HEALTH."

June 27, *at* 10 *a.m.*

The following resolutions were unanimously passed :—

(1) "That the Conference is of opinion that the Housing and Town Planning Bill should include provision for the more effective control of the future registration and sub-letting of dwelling houses, so that adequate provision may be made for proper washing, larder, laundry and lavatory accommodation."

(2) "That notwithstanding the facilities already granted under Orders of the Local Government Board in regard to the promotion of housing and town planning schemes, the Conference is of opinion that the Housing and Town Planning Bill now before Parliament should be passed into law without delay."

(3) "That the Conference is of opinion that the erection of dwelling houses in the congested parts of cities and towns should be minimized, and that every facility should be provided to ensure their erection in open suburban areas, and that adequate, rapid and cheap means of locomotion between the dwelling houses and places of occupation should be provided."

(4) "That in the view of this Conference a wider and more liberal interpretation of the by-laws of many districts is necessary, and that full discretionary power should be given to the Ministry of Health to authorize modifications to meet local requirements."

(5) "That in the preparation of designs for new houses which are to be erected in the immediate future, special regard should be

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given to the provision of the best methods of ventilation, heating and sleeping accommodation, together with a rigorous enforcement of the by-laws designed to protect the dwelling from damp, with the object of combating and preventing tuberculosis and of improving the general health of the community."

CONFERENCE IV.

ON "MATERNITY AND CHILD WELFARE."

June 27, *at* 2.30 *p.m.*

The following resolutions were unanimously passed :—

(1) "That this Conference views with great satisfaction the results already obtained from efforts made to promote the welfare of motherhood and infancy, and welcomes the prospect of fuller appreciation of the services which can be rendered by properly trained midwives and health visitors."

(2) "That the Conference considers the proper distribution of midwives and health visitors should be within the purview of the Ministry of Health."

CONFERENCE V.

ON "THE TUBERCULOSIS PROBLEM UNDER AFTER-WAR CONDITIONS.

June 28, *at* 10 *a.m.*

The following resolutions were unanimously passed :—

(1) "That in the opinion of this Conference all schemes for the prevention of tuberculosis should be of general application, and it recognizes that sanatoria, colonies and other establishments for treatment and segregation are of the utmost value in the prevention of tuberculosis."

(2) "That the Conference recognizes the obligation to provide not only for the tuberculous soldier, but for the tuberculous wife or child of the soldier or civilian, or for any other member of the population."

(3) "That this Conference recognizes the necessity for adequate provision being made for the treatment and training of sufferers from non-pulmonary tuberculosis, more especially in the case of adult sufferers for whom no provision had hitherto been available."

All the above Conferences were held in The Guildhall of the City of London.

E. W. HOPE, M.D., D.Sc.
T. N. KELYNACK, M.D., M.R.C.P.
Hon. Secretaries.

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Reviews.

New Reduction Methods in Volumetric Analysis. By Professor E. Knecht, Ph.D., M.Sc., and Eva Hibbert, M.Sc.

This monograph is a re-issue with additions. Titanous chloride was introduced about fifteen years ago by Professor Knecht as a reducing agent into volumetric analysis and in the present publication details are given of the many ways in which this reagent can be used. The first part deals with the preparation of titanous salts and their use as qualitative reducing agents. In the second part a number of analyses are given to show the value of the reagent for estimating metals, non-metallic elements and their compounds. The third part contains details of analytical methods, and quantitative estimations of certain organic compounds, dyes, sugars, &c. The addendum describes new or improved methods in the estimation of hydrosulphites, sulphurous acid, nitrates, certain nitro-compounds, &c. The new methods based upon the use of titanous chloride cover a wide field in inorganic and organic chemistry; they are rapid and accurate, and although a certain amount of practice is required to carry them out successfully, the descriptions given are such as can be entrusted safely to second and third year students. This is a handy little volume and contains much clear information dealing with the subject.

The Newer Methods of Blood and Urine Chemistry. By R. B. Gradwohl, M.D., and A. J. Blaivas. London: Henry Kimpton. St. Louis: The C. V. Mosby Co. Pp. 240. Price $2·50.

This book has been written in response to the demand of many professional friends of the author, who are interested in laboratory investigations. Much detailed information is given regarding the methods of blood and urine chemistry along the lines of micro-chemical investigation. The tests are fully described and the apparatus is illustrated. The first part of the work deals with technique and the second half is devoted to the interpretation of the data obtained by the chemical methods of blood examination. The subjects of diabetes mellitus, acidosis, interstitial nephritis and the chronic nephritides, &c., are well discussed. Pathologists would do well to have this book in their laboratories so that they may become acquainted with modern methods in hæmatology and urinology. The sources of error to be guarded against are emphasized. This is a reliable and accurate monograph for those interested in laboratory diagnosis. It is copiously illustrated with line drawings, half tones and coloured plates.

Housing: The Present Opportunity. By E. J. Smith. London, 1918: P. S. King and Son. Pp. 98. Price 1s.

Nine excellent addresses given by Councillor Smith, Chairman of the Bradford Corporation Health Committee, to various bodies have now been incorporated by the author and published in neat pamphlet form. *Inter alia*, the Bradford plans for post-war housing of its workers in ten model villages of the garden-suburb type are given. These proposals present several new features consistent with the new ideals of race regeneration, recognizing as an indispensable factor, the improvement of the environment into which the children of our workers are born. The addresses make interesting reading and students of housing would do well to critically examine the proposals made therein.

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Volume XXVII. SEPTEMBER, 1919. No. 9.

LONDON CONFERENCES, 1919.

Inaugural Meeting.

Opening Remarks [1]

BY

The Right Hon. Sir HORACE BROOKS MARSHALL, LL.D.,
Lord Mayor of London.

This is an occasion of specially good omen in the history of The Royal Institute of Public Health. Its long series of annual Congresses, which had grown steadily in importance and fruitfulness, was interrupted by the war. To-day that series is resumed.

The Conferences of 1919 meet in the midst of rejoicing over the immediate prospect of a peace of victory and justice.

Fortunately, the public-spirited generosity of the supporters of the Institute—foremost among them Lord Leverhulme, its President—had provided it with a technical equipment which enabled it to carry on during the recent years of trial, and indeed, to do some of its best work.

For many years the Institute has advocated the organization of a Ministry of Health. The first definite proposal to that end was made, I believe, at the Congress held in Dublin in 1892. I may congratulate you that you are renewing your Congresses on the eve of the coming into existence of such a Ministry.

It is also to the credit of the Institute that thirty years ago it secured the thorough-going reform of the Public Health services of the country, the starting-point of all enlightened progress in this respect.

Speaking as a business man, I regard it as a striking fact that the Institute has done so much since 1886 with no income to rely on but the subscriptions of its membership. That it has been able to carry on financially during the war is a testimony to the soundness of its business administration, and strengthens the case for an endowment fund, about which Lord Leverhulme will, no doubt, have something to say to you this afternoon.

As to this, I would say that we stand on the threshold of a time of enormously increased activity in all that concerns the nation's health. Nothing is more desirable than that the Institute should be placed in a position to continue its progressive work in that cause. It occupies a high and honoured place among those organizations that contribute to the public good. I am sure the Conferences will inaugurate a series of meetings that will be increasingly productive of measures to promote the health of the people.

[1] Delivered at the Mansion House Meeting, June 25, 1919.

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THE ROYAL INSTITUTE OF PUBLIC HEALTH: PAST, PRESENT AND FUTURE.[1]

BY

THE RIGHT HON. THE LORD LEVERHULME,
President.

AT this, the Inaugural Meeting of the first post-war Conferences of The Royal Institute of Public Health, held through the courtesy of the Lord Mayor of London in this hospitable Mansion House, at the very centre of our great Empire, my first words must be words of thanksgiving and welcome—thanksgiving for deliverance from the powers of darkness, welcome into the new day of freedom, justice and progress.

We are gathered to consider the past, present and future of The Royal Institute of Public Health, and the great movement for the advancement of the nation's health and happiness which the Institute exists to further.

The Institute was founded in 1886, and in a recently issued brochure a synopsis has been provided of its work during the past thirty-three years. Much valuable service has been rendered. To-day the influence of the Institute is far-reaching. Its Fellows are found in all parts of the world. Its official journal circulates throughout the Empire and is welcomed in many foreign lands. Among the institutions of the Empire striving for the spread of scientific truth, and the establishment of agencies making for the welfare of the community, the Institute occupies a foremost place.

Brief reference may be permitted to some few of the services rendered by the Institute. Mainly through its instrumentality our universities and medical corporations have established a registrable Diploma in Public Health, which has led to a conspicuous advance in our knowledge of the principles of Preventive Medicine, and to the organization and administration of a Public Health Service which is second to none in the world.

In 1892 our Institute was incorporated as The British Institute of Public Health, and in 1897 Her late Majesty Queen Victoria, in recognition of the national service rendered by the Institute, conferred upon it the title of Royal and became its Patron. This

[1] Being an address delivered at the Inaugural Meeting of the London Conferences, 1919, held in the Egyptian Hall of the Mansion House, on Wednesday, June 25, at 3 p.m.

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Patronage has been graciously continued by His late Majesty King Edward VII and by His Majesty King George V. H.R.H. The Prince of Wales has just accepted the position of Vice-Patron.

A notable feature in the history of the Institute has been its series of Annual Congresses. The first Congress was held in Dublin in 1892, and in following years gatherings have taken place in Edinburgh, London, Hull, Glasgow, Blackpool, Aberdeen, Eastbourne, Liverpool, Folkestone, Cork, Douglas, Buxton, Leeds and Birkenhead. In 1912 the Congress met in Berlin, in 1913 in Paris, and immediately before the outbreak of war in 1914 in Edinburgh, and in 1920 it is to be held in Brussels.

To the present gatherings we have given the modest name of Conferences, as the exigencies of the present situation, when we are eagerly awaiting the coming of a declared peace, have made it necessary to concentrate all attention on the scientific and practical aspects of our meeting.

Since 1905 the Institute has had its home in Russell Square, where an admirable series of laboratories have been established for educational and research work. Courses of instruction are given and are recognized as qualifying for admission to the examinations for the Degrees and Diplomas in Public Health of the Universities and Medical Corporations of the United Kingdom. The laboratories provide opportunities for the conduct of research work for public authorities, and for private individuals.

The Institute possesses a valuable Reference Library, a Museum and a Lecture Hall. With the establishment of such an effective centre in the heart of London's educational activities, many new developments have been made possible. Departments of State Medicine, National Health, Military Hygiene, Agricultural Micro-Biology, and for the study of Venereal Disease, have been established, and departments for Maternity and Child Welfare and Tuberculosis are in course of development.

Reference may also be made to the founding of the trust created by the late Sir Henry Harben, providing for the delivery of an Annual Lecture and the bestowal of the Harben Gold Medal for "Eminent Services rendered to the Public Health." A further trust, the Smith Award, has recently been established providing for the bestowal every third year of a bronze figure of Hygeia to a Medical Officer of Health who has won conspicious recognition for noteworthy service in the discharge of official duties.

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Attention should also be directed to the valuable service which has been rendered to medical officers of health and students of sanitary science by the monthly issue of the official organ of the Institute, THE JOURNAL OF STATE MEDICINE.

During the last four years and more of war the Institute, like all other scientific bodies, has felt the stress and strain of the great upheaval. Our Fellows and Members have been scattered far and wide and engaged for the most part in some form of national service. Students have been withdrawn, and in short the life of all departments has been deranged. But even in the midst of this unexampled disorder the Institute has been enabled to accomplish national work of the highest value. It has conducted no less than seven courses of Lectures and Discussions on "Public Health Problems under War and After-war Conditions," and as lecturers and chairmen many of the best known of our British authorities have taken part. The lectures have been published in the official journal and so have brought the latest and most complete information to our Fellows scattered throughout the world. By these lectures and records invaluable services have been rendered to our national efficiency.

Remembering what the Institute has accomplished in years of peace and days of war, and in view of what the Institute hopes to accomplish in this all-important period of reconstruction and readjustment, the Council are of opinion that a worthy Memorial of the war might wisely take the form of an Endowment Fund which will provide means for the further development of the Institute.

At this important inaugural gathering of the first post-war Conference of our Institute I make an appeal for financial support.

In addition to the records I have already laid before the meeting, there are many other facts and arguments which might well be presented in support of this appeal, would time permit.

Since incorporation the Institute has carried on its work without endowment, being mainly supported by the subscriptions of the Fellows, who are medical men connected with the Navy, the Army, and the Public Health Services generally.

In view of the formation of a Ministry of Health and all that this implies for the prevention of disease and the improvement of the social condition of the people, it is now felt that in order to enable the Institute to maintain the usefulness of its Research and Teaching Laboratories, to enlarge its valuable monthly Journal and

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to provide for the issue of other scientific publications, and generally to further the medical, educational and sociological interests of the Nation's health, the time has arrived for the establishment of an Endowment Fund. It is with some confidence that I appeal for general assistance to raise at least a sum of £50,000. A donation of £1,000 has already been promised and I shall be pleased to acknowledge the receipt of all donations and subscriptions.

As President of the Institute I believe that the discussions which are to be held at the Guildhall during the next few days will afford the strongest arguments of all in support of the appeal which it has been my privilege to present to this representative meeting.

Vital subjects of far-reaching importance are to be considered, touching the work of the Ministry of Health, the Prevention and Arrest of Venereal Disease, Housing in Relation to National Health, Maternity and Child Welfare and the Tuberculosis Problem under after-war Conditions. As the outcome of this Conference the great cause of National Health, Happiness and Efficiency will receive a fresh impetus and leaders will be directed along sound paths of progress. I believe also that The Royal Institute of Public Health will receive such substantial assistance and such increase of national recognition as will strengthen its powers for service in the new era on which we are entering.

I beg to move the following resolution :—

"That this Inaugural Meeting of the London Conference of The Royal Institute of Public Health having heard the statement presented by The Right Hon. The Lord Leverhulme, the President of the Institute, is of opinion that the Institute is eminently deserving of support and that steps should immediately be taken to place its work upon a sound and permanent basis, and, with the object of ensuring this, the Meeting is of opinion that it is desirable an appeal should at once be issued for adequate financial support, and that steps be taken to urge the claims of the Institute upon His Majesty's Government with the view of securing Treasury assistance."

The motion was seconded by H.M. King Manuel, K.G., supported by The Right Hon. The Earl Beauchamp, K.G., The Right Hon. Viscount Knutsford, The Right Hon. Lord Willoughby de Broke, The Lord Bishop of Hereford, Surgeon Rear-Admiral Sir Robert Hill, K.C.B., Sir Thomas Oliver, M.D., The Dean of St. Paul's, Mrs. Scharlieb, M.D., with others, and unanimously carried.

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THE WORK OF THE MINISTRY OF HEALTH.[1]

BY

COLONEL SIR WILLIAM SMITH, M.D., D.L., J.P.

Sheriff of London.

Principal of The Royal Institute of Public Health.

MY first duty on behalf of The Royal Institute of Public Health is to extend to you a very sincere welcome, and to express the hope that your deliberations in connection with the various conferences which have been arranged in this ancient centre of municipal life —for which privilege we are indebted to the courtesy of the Corporation of the City of London—may not only be found useful in the discharge of the important duties entrusted to you, but be of lasting benefit to those communities whose health interests it is your task—voluntarily undertaken—to preserve and improve.

My second duty is to express my sense of the honour done me by the Council of the Institute in inviting me to preside over this conference on "The Work of the Ministry of Health," an honour which I understand is consequent on my life-long connection with the cause of Preventive Medicine in various professional capacities, and the advantage I have enjoyed for many years as a member of several Municipal and Poor Law Authorities.

It is very fitting that these conferences should be called under the auspices of The Royal Institute of Public Health, a body perhaps which more than any other in this country, has done much to create a sound public opinion on the many subjects to be shortly correlated under the Ministry of Health.

Founded some thirty-three years ago, with the avowed object of obtaining legislation for securing a race of properly trained and specially qualified medical men who should alone be eligible for positions as Medical Officers of Health, it soon attained its object, with the result that now at the head of every Public Health Administration in the Kingdom you have such a specialist, whilst a similar qualification is sought by those desirous of obtaining like positions in the public services, be it the Royal Navy, the Army or the Colonial Service—it is difficult to exaggerate the far-reaching importance of this.

Since this time by its congresses, its lectures, the establishment

[1] Being the opening address to the Conference on "The Ministry of Health" in the Guildhall, London, June 26, 1919.

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of laboratories both bacteriological and chemical—the use of which has been freely placed at the disposal of local Sanitary and other Authorities—it has done much for the cause of the public health in this country, and it is interesting to note that it was at its first Congress of Delegates from Local Authorities and other bodies held in Dublin in 1892, that a resolution was unanimously passed urging upon the Government the formation of a Ministry of Health, which resolution received endorsement at its subsequent annual meetings.

It must be gratifying to those pioneers, of whom I fear but few remain, to find their far-seeing desires at last realized.

I cannot refrain here from alluding to one who, unhappily, is no longer with us, but to whom we are all much indebted for the great stimulus he gave in Government circles to this subject, I mean the late Viscount Rhondda, but we rejoice to know the Viscountess Rhondda is as deeply interested in the matter as her late father, and that her ladyship is using her high position and great powers to ensure a proper carrying out of the new legislation.

I do not propose to occupy your time with the reasons which have rendered legislation necessary, with these you are fully conversant, and some of them will doubtless be mentioned later, but what I want to emphasize at the outset, and what as yet has, I think, not been fully realized, is that the Government has a deep and grave responsibility and duty in reference to the well-being and lives of its citizens, further admitting this responsibility it follows it should be directly interested in the qualification of those entrusted with the care of such lives ; and, thirdly, it should by proper means, financial and otherwise, ensure that the knowledge of those thus entrusted should be kept up to date.

As regards the first of these propositions, I am of course aware of the good work done by the Local Government Board, although in justice, it should be remembered, that many general health measures had their origin in special acts of local application only, promoted by the Health Committees of one or other of the large municipalities, of these I need only instance the Infectious Diseases Notification Act, the Notification of Tuberculosis, the Notification of Births Acts, whilst other important measures which found their first place in local acts, before the passing of any general act, dealt with Housing, Town Planning, a Pure Milk Supply, Milk for Mothers who were unable to suckle their children, and Clauses which were forerunners of the Children Act.

I mention these incidents to emphasize the fact that Local

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Authorities are alive to their responsibilities, and that whatever measures result from the creation of a Ministry of Health, it would be unwise to put into operation any which would destroy or even impair the usefulness of such bodies.

Another example which I might instance in this connection, and one the value of which we now fully recognize, is the School Medical Service. This Service did not emanate with the Education Department, but with the School Board for London, I well remember—for I was the first medical officer to that Board—and, indeed, of any Elementary School Authority in the kingdom—how difficult it was for me to obtain a Clause in the report of a Departmental Committee on Mentally Defective Children—of which I was a member—urging the appointment by the Education Department of a medical officer, and it was not until many years had elapsed that such an appointment was made in the person of Sir George Newman, a distinguished student of my own, whose brilliant success in that office has more than justified his appointment to the Ministry of Health, and in whom all who are interested in the progress of the public health have the most complete confidence.

Admitting now by the passing of the Act, we are to consider that the Government fully realize its duties in connection with the lives of the citizens of the State, there are two questions which naturally follow, and to which their attention should be directed; the first of these is, that they should admit their responsibility, and see to it that those entrusted with the care of such lives are properly qualified to discharge these responsible duties; and the second that the knowledge of such qualified persons, both men and women, are kept abreast of the times.

I am one of those who feel that the first of these cannot properly be delegated to some twenty-seven examining and independent bodies, but that admission to the medical profession should be consequent on passing such examinations as may be necessary under State control. I am, of course, aware that it may be urged the present examinations are subject to inspection by the General Medical Council, to which I would reply that this is a body mainly composed of the representatives of interested bodies—twenty-seven out of a total membership of thirty-seven—and as regards the second point, I do not suppose there will be any difference of opinion that facilities should be afforded by the State, in the interests of the public, to members of the medical profession to keep their knowledge abreast of the progress which is yearly being made in all branches of preventive and curative medicine.

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I do not wish to labour these questions, but they are subjects which in my judgment call for early and serious consideration.

Closely allied to this is the necessity which exists for much greater encouragement for research. It is really lamentable to reflect upon the discouragement which has been shown in the past to this all important national necessity both as regards medical and commercial progress.

In this country there has been no systematic training for research workers, and be it remembered such men require special qualifications to ensure success—not only a thorough scientific training, but aptitude for the work, great patience and perseverance, together with sound judgment and an analytical power of mind. For this adequate financial support must be forthcoming to secure the services of such investigators.

The War has done much to increase our knowledge in the scientific aspects of medicine; the experience thus obtained must in the interests of the nation not be lost.

The prevention of disease is more important than its cure, and we who are convinced of this, expect from the Ministry of Health the most enlightened and active steps in this direction, and from the Treasury adequate financial support; but whilst I say this, and I doubt not you will agree with me, we cannot lose sight of the curative side of medicine, e.g., our hospitals play an important part in our national life, not only as affording relief to the sick poor, but as training schools for the medical profession, and in these we look for reform and development in many important directions.

Some discussion has recently taken place in the *Times* as to the qualification of sanitary inspectors. I can recall the time when such appointments were made on anything but satisfactory grounds, but under the provisions of Section 108 of the Public Health (London) Act, 1891, so far as London is concerned, no such appointment can now be made unless the candidate has passed an examination approved by the Local Government Board, and the only examination thus approved is that of a perfectly independent and representative body, the Sanitary Inspectors Examination Board, —a most urgent necessity is to extend the Clause to which I have referred, together with the operations of this Board to the whole Kingdom.

Whatever may have been the case in the past, all Public Health Authorities are now anxious to secure the services of properly qualified officials, whether medical officers of health, sanitary

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inspectors, health visitors, or whatever the office may be, and I hope it will be considered by the Ministry of Health as a primary duty to insist upon a proper training for such positions which can well be left to various educational bodies, but the actual granting of the qualifications should in my judgment be by the State.

The Ministry of Health Act and the Scottish Board of Health Act received the Royal Assent on Tuesday, June 3, the birthday of His Majesty the King, who has always evinced the greatest personal interest in the well-being of his people, it is an interesting coincidence in view of the action of the Institute's Congress in Dublin many years since, that the order in Council creating the Ministry of Health should be signed by His Majesty, the Patron of the Institute, on the first day of our meeting this year.

The former of these Acts is applicable to Ireland with certain necessary provisions.

The Act provides for the appointment of a Minister of Health, whose duties shall be the taking of such steps as may be necessary to secure the preparation, effective carrying out and co-ordination of measures conducive to the health of the people, including measures for the prevention and cure of diseases, the avoidance of fraud in connection with alleged remedies, the treatment of physical and mental defects, the treatment and care of the blind, the initiation and direction of research, the collection, preparation, publication and dissemination of information and statistics relating thereto, and the training of persons for health services.

With the object of effecting such co-ordination there are transferred to the Minister:

All powers and duties of the Local Government Board, of the Insurance Commissioners, such duties of the Board of Education as relates to the health of expectant mothers and nursing mothers and children under 5 years of age, the powers and duties of the Board of Education relating to medical inspection and treatment of children and young persons, it being provided that some mutual arrangement may be made by the two Government departments for this purpose—the powers of the Privy Council under the Midwives Acts and certain powers under the Children Acts.

Further, it is provided that by order in Council the powers and duties of the Minister of Pensions, those relating to lunacy and mental deficiency, or any powers of any Government department relating to or affecting the health of the people may be transferred to the Minister, and by the same procedure the powers and duties

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of the Minister relating to the Poor Law, other than those relating to the health of the people, are to be transferred to any Government department created by a subsequent Act.

An important provision in the Act is that relating to the establishment of Consultative Councils consisting of both men and women having practical experience of such matters as may be referred to them—we have at present no authoritative statement as to these Councils other than that indicated in the appendix to the memo on the Bill, nor have we any very definite information as to the composition of these bodies, but we are informed they are to be four in number, one in connection with medical and allied sciences, a second dealing with National Insurance, a third with Local Health Administration, and the fourth with general health questions. We can only hope that a wise selection will be made as to their membership, which I understand will for each be twenty in number, and that the services of those will be sought whose life work have been connected with the various subjects to be considered. I mention this because there is always a danger whenever a great movement is initiated for those who have hitherto evinced no interest in the matter to suddenly seek notability and prominence in the Press, and by other means.

Very great powers may be obtained by so-called orders in Council, and it will be essential for those interested in the working of the Act to pay attention to these, a draft of which must be laid before both Houses of Parliament for at least thirty days, and if before the expiration of that time an address from either House be presented to His Majesty against the Orders, no further proceedings can be taken.

I have thus briefly indicated some of the great duties which it is proposed should devolve on this new Ministry, leaving it to those gentlemen who are to succeed me and whose good services we are very fortunate to secure, to elaborate various aspects of the question, but I would venture to express the hope that we shall not expect from this new Ministry too much at first, the work before them is stupendous and everything depends upon the organization to be created whether success or confusion follows. Our great hope and desire is success; and I am sure I am interpreting your feelings when I say, the experience which we have obtained in the public services we have rendered, will be freely placed at the disposal of the Minister to ensure this, if he so desires.

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LOCAL ADMINISTRATION OF THE WORK OF THE MINISTRY OF HEALTH.[1]

BY

LIEUT.-COL. F. E. FREMANTLE, M.B., F.R.C.P., F.R.C.S.
Consulting Medical Officer for the County of Herts.

The need for unification of County or County Borough Councils and Insurance Committees, of Borough and District Councils and Boards of Guardians, each with its own institutions; and of co-ordination with Private Hospitals and Nursing Associations is generally agreed.

It is obvious to those who have served in the war and seen the possibilities of a complete system of medical and sanitary provision and administration, comprehensive, primarily preventive, focussed on the end in view, effective to the maximum limits of personnel, material and conditions available, with a clear definition of authority, responsibility and duty throughout.

This must be the aim of the new Ministry and of the local authorities that will function under it. But the *essential differences between military and civil life* must always be remembered. In civil life there is no single fountain of authority; authority is derived from the people at each stage; the central authority must co-ordinate, advise, assist and secure individuals and the community against disaster, but the local authority must be given liberty in the expenditure of its money, must be allowed to make mistakes and to suffer and learn from them. So only can democracy be educated to sound self-government. In the Army the physical efficiency of the mass and its fighting morale are the essential objects to be attained; in civil life individual interests and the other sides of human life require larger consideration. Yet in the main and within clear limits, the efficiency of the military system points the way in civil life, as it was pointed by Dr. Parkes after the Crimean War.

The Defects in the present system of local administration may be briefly summed up; (*a*) *Multiplicity* of inspectors, of independent authorities, each with its own councillors and officials, reports and

[1] A Paper read at the Conference on "The Work of the Ministry of Health," in the Guildhall, London, June 26, 1919.

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investigations, offices and institutions, involving unnecessary elections, disturbance to households and waste of time, effort and money; (*b*) *Negative defects*, such as lack of continuous responsibility for each individual at different stages of life, lack of regard for the family as a whole, as the unit of national life, and the disappearance of the family doctor, who should combine healthy advice with his treatment, and not least the lack of provision for the poorer professional and commercial classes; (*c*) *Bad "liaison"* between central and local authorities, between adjacent local authorities, e.g., those of counties and county boroughs, and between the separate authorities and voluntary organizations of the same area. New developments are thus difficult and too often involve the creation of a new authority and new officials and offices. A complete health policy is impossible.

But *the reasons for these defects* have largely disappeared. Communications have shortened distances. Education and the Press have widened information and imagination and brought local government into close touch with Parliament and Whitehall. They have widened the scope, ambitions, and field of choice and increased the elasticity of the public services.

The *constructive action*, therefore, to be taken is firstly to unify the local authorities, the medical and nursing services, the inspectorate and the provision for public assistance. The principles should be that of home rule for each county area, the more extreme anomalies of area being removed. The method of securing this end might best, it is suggested, be obtained by limiting local elections to the election of District and Borough Councils, these to elect representatives to County Councils or, in County Boroughs, representatives to sit on the Councils of adjacent counties, at least in an advisory capacity. The County and County Borough Councils should be given greater responsibility of freedom, e.g., in executive powers and as the sole distributors of government grants within their area. The Ministry of Health should correspond and deal with the District Councils only through the County Councils.

Certain conditions are essential: (*a*) Unification must be largely assisted by development of communications under the new Ministry (to attend the meetings of a county authority should now be easier than to attend the meetings of many rural districts twenty-five years ago); (*b*) but it is also essential for members of local authorities to be repaid for actual losses incurred; (*c*) on the other hand every

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person of any class or calling who is peculiarly fitted to assist in any one department of health-administration must be available for such service; co-opted members are essential to efficient local administration; it may or may not be advisable to deprive them of voting power in financial business, but the principle of their use is no more opposed to democratic theory than that of paid officials, for whom the elected authority is equally responsible to the electorate; (*d*) voluntary work, organization, propaganda and institutions must be recognized, guided and encouraged; (*e*) systematic liason must be established between neighbouring authorities and between local authorities and the Ministry of Health—the District Housing Commissions may supply a useful precedent; (*f*) the main committees of a local authority should be few and should be co-ordinated by the Finance Committee in deciding the financial limits within which they must respectively work; (*g*) the health work, both curative and preventive, must be directed solely by one administrator, with specialists in the various institutions and departments of the work, whole-time and part-time, visiting or resident; (*h*) the sanitary, medical and nursing services must be nationalized as to qualifications, payment, pension and promotion, appointments being made by local authorities in consultation with the Ministry through its Commissioners.

Finally, let us realize *the result* of such unification. Not only will it promote direct efficiency, but it will focus public interest on the local authority and promote a better understanding of its work and aims. It will increase the appreciation of Reports of proceedings and of the annual Reports of officers and committees. It will therefore enhance the importance of public meetings and of local elections in the opinion of the electorate; it will attract the ambitions of the noblest in all classes and both sexes at all ages to assist in the spade-work of local government, which is ever building, renewing, maintaining and extending the foundations of our National and Imperial life.

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MATERNITY AND CHILD WELFARE: THE PROTECTION OF MOTHERHOOD.[1]

BY

SIR FRANCIS H. CHAMPNEYS, BART., M.D., F.R.C.P.

Chairman of the Central Midwives Board.

I shall not attempt to do more in the few minutes which have been allotted to me for the introduction of this vast subject than to indicate its outlines.

The protection of the mother strictly concerns the healthy development of the female child from the time of its conception. In this way any disease of the fœtus which interferes with its healthy development may affect that child in pregnancy or parturition. Thus venereal diseases cannot be ignored in this connection, especially congenital syphilis. In early childhood we have to deal with such affections as rickets, which is a fruitful source of pelvic deformity, and is certainly preventable. Thus antenatal care and the care of childhood cannot be separated from the subject of the Protection of Motherhood.

In the same way the influence of the health of a woman before marriage cannot be left out of account. But the more immediate domain of the subject is the period of pregnancy, parturition, and lying-in. It is, I think, a mistake to imagine that care of the mother before her confinement is a subject which has only just received attention. Speaking from my own experience I should say that careful medical practitioners for a long time past have taken care that those women for whose confinement they were to be answerable were free from obvious abnormal conditions which might adversely affect their pregnancy, such as pelvic deformity and toxæmia.

I admit that greatly increased attention has been lately directed to this subject, and the systematic examination of pregnant women, poor as well as rich, is becoming one of the recognized duties of our profession from the point of view of national health.

How is this provided for at present?

In the case of the affluent the responsibility rests with the medical attendant. In the case of the poor generally with the

[1] A Paper read at the Conference on "Maternity and Child Welfare," in the Guildhall, London, June 27, 1919.

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midwife. But, it is sometimes said, it is not safe to leave to a midwife to decide whether medical help is or is not necessary.

The Central Midwives Board puts no such responsibility on midwives. Generally speaking, it discourages diagnoses and requires observation of abnormal signs and symptoms.

In its Rules (E. note, p. 20) it lays down their duties as follows: "Whenever illness or abnormality has occurred in the previous pregnancy, and whenever the previous pregnancy has ended in an abortion, a premature labour or a stillbirth, the midwife, on being engaged to attend the patient in her next confinement, should explain that the case is one in which skilled medical advice is required, and should urge the patient to seek advice from her medical attendant, or at a hospital, or other suitable institution."

Rule 1: "When engaged to attend a labour the midwife must interview her patient at the earliest opportunity to inquire as to the course of the previous pregnancies, confinements, and puerperia, both as regards mother and child, and to advise as to personal and general arrangements for the confinement, and, with the consent of the patient, visit the house."

Rule 20 (p. 25): In all cases of illness of the patient or child, or of any abnormality occurring during pregnancy, labour, or lying-in, a midwife, as soon as she becomes aware thereof, must explain that the case is one in which the attendance of a registered medical practitioner is required."

Rule 21 (p. 25): The foregoing Rule shall particularly apply x (2), p. 26: "In the case of a pregnant woman, when there is any abnormality or complication such as—deformity or stunted growth. . . . Excessive sickness. . . . Puffiness of hands or face. Fits or convulsions. . . . Purulent discharge. Sores of the genitals."

It will be seen that a midwife who observes the rules will be on the track of venereal disease, eclampsia, and other diseases, which she is not, however, asked to diagnose, and that neglect to report abnormal conditions of any kind is a penal offence for which she may be struck off the Roll.

A question is sometimes put whether every pregnant woman ought not to be examined at least once by a skilled medical practitioner.

This proposal has much in its favour but there are certain difficulties. In the first place a solitary examination of the urine, however skilfully done, will not prevent eclampsia. This disease

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is of the most insidious nature, and requires constant vigilance. The person who is in the best position to safeguard the patient is he or she who is in touch with the woman during her pregnancy. This may be the medical attendant or it may be the midwife.

A properly trained midwife is now taught to test the urine, and a pregnant woman in the hands of such a person has the advantage of being under frequent observation so that periodical examination of the urine may be made, and that any warning sign such as "puffiness of hands or face" may be at once the indication for a prompt examination of the urine.

Any order to the effect that every pregnant woman must be seen by a medical practitioner practically entails compulsory notification of pregnancy; and, unless compulsion applies to the duchess as well as to the charwoman, would not be tolerated. Even then, it would be sure to excite strenuous opposition, and would probably be evaded. In addition our countrywomen are not likely to forgo the right of choosing their own attendant. On the other hand all midwives are obliged to advise medical help "in all cases of illness of the patient or child, or of any abnormality occurring during pregnancy, labour, or lying-in." What is necessary is confidence and co-operation between doctors and midwives in private practice and in maternity and antenatal centres.

A great step will be gained when the prompt payment of medical practitioners is secured. The absence of machinery for effecting this has been a great drawback to the efficient working of the Midwives Act. Its absence is not, as is apparently sometimes imagined, the fault of the midwives, nor of the Central Board, but largely of those agitators who attempted to wreck the Bill of 1902, and refused to co-operate in its improvement.

The anxiety lest medical practitioners should be displaced by midwives in obstetric cases seems to be giving way, in some quarters at least, to an apprehension lest unwilling medical practitioners should be compelled to attend midwifery cases.

(Memorandum by the Medico-political Union on the Report M. 25, issued by the Insurance Acts Committee of the British Medical Association, and the Insurance Commissioners as to the revision of the conditions of service of medical practitioners under the National Health Insurance Acts with suggested extension of such service.)

Rules of the Central Midwives Board under the scheme of the Midwives Act, 1902, put medical practitioners into the position of

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consultants to midwives, and it is a great pity that this has not been realized; for it might have prevented the antagonism which has so much hampered the working of the Act.

If medical practitioners are not to practise midwifery, it seems plain that they will not be properly qualified to act in this capacity, and that only those possessing adequate obstetric experience will be in a position to do so. Time will not allow me to make similar illustrations of the care of parturition and the lying-in period; but the lines of defence are on the same principle.

As regards the result of the Midwives Act, it may be shortly said that the mortality of childbirth came down with a run from the time when it came into operation in 1902. I have repeatedly given the figures. The improvement has been maintained but has not notably advanced. This is somewhat puzzling. We want to know in whose hands these cases continue to occur. If the Registrar-General could have seen his way to grant the request of the Central Midwives Board some years ago to leave a space in the death certificate in which the name of the person who actually delivered the patient could be entered, we might know more about it than we do, but our request was not granted. The deaths from accidents and complications of childbirth have been less affected than might have been hoped.

What is wanted? In the first place further knowledge as to the conditions under which sepsis still occurs; whether in the hands of midwives or of doctors; whether after normal or after abnormal labours; whether in spite of the best aseptic and antiseptic care, and in what such care consists; whether sepsis appears to be endogenous or exogenous in its origin; and the influence of the environment.

As regards accidents or complications, whether such have arisen unforeseen or not, and how they have been dealt with.

As regards lying-in, the influence of the environment and the conditions as regards length of recumbency and of seclusion; all these are important, but a complete list will not be attempted.

In any scheme for the Kingdom it is certain that a great increase of obstetric institutions such as lying-in hospitals or maternity homes is desirable, and that such institutions should be distributed over the country in such a manner that no parturient or lying-in woman should be beyond the reach of one of them. This would entail great expense, for the staff of such institutions

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would need to be available at any time of the day or night, and would have to include members who could visit patients in their homes on emergencies; also motor ambulances to convey patients to the institution would be necessary.

These institutions would be of great service in the matter of training medical students and midwives, both within their walls and in districts over which it is hoped that they may preside.

It has been proposed that arrangements should be made whereby it might be possible for all parturient women to be confined away from home, and in institutions, lying-in hospitals, and maternity homes. This is obviously a large order, and I have tried to see what number of lying-in beds would be required for England and Wales. This is a difficult matter. In the first place it is impossible to ascertain the number of women who bear children. In the next place it is necessary to determine how long they would stay in the hospital or institution.

Dr. Stevenson of the General Register Office has kindly written as follows: "The number of live-born children registered in England and Wales during 1914 was 879,096." Stillbirths are not yet registered before twenty-eight weeks of pregnancy. These would add more mothers. Against this we must reckon multiple births, which would diminish the number of mothers. I do not think that we should be seriously vitiating our calculations if we left out stillbirths and multiple births and took simply the number of live-births.

Next we want to know how many patients a lying-in bed will accommodate in the year. The three London lying-in hospitals have given the following figures :—

	Number of beds.	Stay in Hospital.	Number of In-patients.
Queen Charlotte's ...	87	12-13 days	1,649 (1918)
General Lying-in ...	36	11 days prescribed 13 days average.	887 (average of 1916, 1917 & 1918)
City of London ...	61	about 14 days	1,325

Of course the longer the stay the fewer the patients per annum. But, as this is somewhat uncertain; and as, on the other hand the actual duration seems to be some thirteen days, the hospitals may be considered as practically the same in this respect. Of course a bad case will overstay the time, increase the average duration of stay and diminish the number of patients passed through each bed. The number of patients passed through each bed can be approxi-

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mately reckoned by dividing the number of patients by the number of beds.

This gives the following results:—

NUMBER OF PATIENTS PER BED PER ANNUM.

Queen Charlotte's	=	19 (nearly)
General Lying-in	=	25 (nearly)
City of London	=	22 (nearly)

It is plain that the way to get an answer giving the *largest* number of maternity beds necessary will be to take the *lowest* figures in the foregoing table; and to get an answer giving the *smallest* number of maternity beds necessary will be to take the *highest* figures. I will therefore take the *highest* figures, and place the number of maternity beds necessary at the *lowest*.

Taking the number of live-born children registered in England and Wales during 1914 (the first year of the war which was declared on August 4, during which the birth-rate would be unaffected) and dividing them by 25 (the *highest* figure in the above table, which will give us the *smallest* number of beds necessary), we get a quotient of all but 35,164.

In other words, *if all women were to be confined in institutions in England and Wales, more than* 35,000 (*thirty-five thousand*) *beds would be required;* that is if the parturient population were the same as in 1914. There is another small point: The lying-in hospitals do not as a rule admit women who are not actually in labour. If they did, they would admit many women who would occupy a bed for any time from two weeks to two months or more, and the number of the beds would be greatly increased. It is a matter of experience that between the date of expected delivery and actual delivery there is often a wide difference. There would also, to make our preparations complete, have to be an arrangement for the reception of cases in which labour began before the expected time, or for some sort of hostel in which women could wait until labour actually began. This would also greatly increase the number of beds to be provided.

While it seems to be impossible, even if it were desirable, that all women should be confined in institutions, it is also true that many of the homes in which women are confined are insanitary and unsuitable. Unless the nation changes its mind the abolition of insanitary dwellings seems to be one of the things which will certainly follow in due time, and in this way the safety of mothers

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will be beneficially affected. The task involved in the "protection of motherhood" is indeed vast; but, if a right ideal is created, its realization should not be impossible. It is essential that for the creation of such an ideal our minds should be well balanced and sane.

At the foundation of the safety of motherhood lies the security of adequate training in midwifery; and for this, again, a certain number of confinement cases must be available. The above applies to the training of medical students as well as of midwives.

The greatly reduced birth-rate has correspondingly reduced the number of cases available for training, and has rendered midwifery training in some quarters difficult. Suggestions are heard that cases allotted to midwives should be limited in order that more cases should be available for medical students. It has long been evident to me that the machinery which was set up by the Midwives Act, 1902, for the training of practising midwives, has been largely diverted to the object of supplying women who never intended to practise as midwives with a qualification which enhances their professional attractiveness and increases their chances of obtaining posts in their profession, but does not directly benefit the community.

As long as there were plenty of cases to train upon no great harm was done, except in cases where, for instance, a woman was obliged to obtain the certificate of the Central Midwives Board in order to become a Health Visitor, and stepped at once into the position of instructing midwives who knew far more than their instructor. But, in any event, when there is a shortage of cases it is well to see to what extent cases are used for the instruction of those who never intend to practise. I have added to the Midwives Roll an appendix giving the number of midwives enrolled, and the number of those who have notified their intention to practise.

In the Roll for 1918, p. 1845, will be found the "Table showing the numbers of midwives trained at approved institutions (other than Poor Law.)"

The total enrolled is 19,357. The total notified is 4,640. This gives the number of those who have *not* notified as 14,717. Each of these has been trained on twenty cases. This gives 294,340 "wasted."

On p. 187 will be seen the "number of midwives privately trained." The total enrolled is 4,227. The total notified is 1,123. This gives the number of those who have *not* notified as 3,104. Each of these has been trained on twenty cases. This gives

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62,080 cases "wasted." Adding together the two classes we get a grand total of 356,420 cases "wasted."

Cases have also been "wasted" in a sense on two other classes of pupil-midwives.

We have records of women who have altogether failed to pass their examination, numbering 1,609; and of women who have trained but have never sat for their examination, numbering 120. These together give a total of 1,729, each of whom has used twenty cases. This gives a total of 34,580 additional cases "wasted." This waste is probably unavoidable, but it is likely that it principally affects women who did not intend to make their living as practising midwives.

The above numbers are the accumulation in a period of some twelve years.

In 1918 the total enrolled is 1,145. The total notified is 736. The total *not* notified is 402. The percentage of women *notified* is 64. This is very high compared with recent years, and should show that matters are improving if the percentage is maintained.

The only way that occurs to me of stopping the leakage would be to bind down candidates to practise as midwives for a term of years. This would act well in the case of those who aspire to positions of authority such as Health Visitors; though it might be difficult to arrange details.

THE ROYAL INSTITUTE OF PUBLIC HEALTH.

Knighthood conferred on The Principal.

We record with much satisfaction the honour of Knighthood which has been conferred on Colonel William R. Smith, M.D., The Principal of the Institute and Sheriff of London.

The occasion on which the Accolade was given could not possibly have been under more distinguished and historic surroundings, for it was in The Guildhall of the City of London on the 29th July, the occasion being the presentation of an address from the Corporation of The City to His Majesty the King on the victorious conclusion of the War, when His Majesty was accompanied by Her Majesty The Queen, The Queen Alexandra, H.R.H. The Prince of Wales, Prince Albert, and Princess Mary. The Archbishop of Canterbury, the Premier, and other most distinguished personages in the State, the Navy, the Army, the Ambassadors and other representatives of our Allies, etc., being also present.

It has long been a matter of surprise that this recognition of The Principal's public and distinguished services has been so long delayed but we heartily and sincerely congratulate him and trust his life may long be spared to enjoy the distinction His Majesty has bestowed on him.

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TUBERCULOSIS COMMUNITIES.[1]

BY

NOEL D. BARDSWELL, M.V.O., M.D., F.R.C.P.

Medical Adviser to The London Insurance Committee.

I HAVE been asked to open a discussion upon Tuberculosis Communities. Settlements for the more or less permanent residence of tuberculous persons do not yet exist; the discussion therefore must needs be largely of a theoretical character. None the less time may be spent profitably in an exchange of views as to whether the establishment of such communities is desirable, and if so, as to how far and in what form they are practical.

As to the need for settlements. It is within the knowledge of all present that under present conditions the purpose of the sanatorium is, in the main, palliative and educative, and that to become effective as a means of cure the work of these institutions must be linked up with agencies which secure for their patients satisfactory after-care and home treatment. It is common ground also that these agencies are usually lacking and that, in consequence, the proportion of patients who maintain the improvement brought about by treatment in a sanatorium is disappointingly small. There is no need for me to dwell upon the difficult question of the after-care of the consumptive. I would but remind you that the problem is most complex, involving, on the one hand, such issues as housing, employment, and the living wage; and on the other hand those of infection and the protection of the community from the infectious. With these problems the settlement proposal is intimately associated.

The principle of a settlement. One of the root ideas of a settlement is the voluntary segregation of tuberculous persons in a community which would allow of their effective supervision. This measure of segregation is to be encouraged by making the community attractive. The attractions would lie in the offer of healthier accommodation both for married and single patients, opportunity for remunerative employment for those fit for work, graduated in respect of hours of labour to variations of physical

[1] A Paper read at the Conference on "The Tuberculosis Problem under After-war Conditions," in the Guildhall, London, on June 28, 1919.

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capacity, and facilities for the treatment of tuberculosis in all its varying degrees and phases. Thus, the settlement would seek to provide both institutional treatment and after-care. The administration would be somewhat democratic in that the settlers would be encouraged to help themselves; their lives would be purposeful; the material interests of the colonists and of the management would lie together.

Another basal principle of the settlement is the protection of the partly disabled worker from the necessity of competing for his livelihood against the able bodied; a struggle which the consumptive is singularly ill-fitted to sustain and which more often than not, spells death for him within a few years. At the settlement, industries would be established and conducted upon business lines, the workers receiving the current wage for all work performed.

The preservation of the family unit. It is a truism that it is useless to consider the consumptive apart from his family. In many instances, patients would be unwilling to migrate to a settlement unless accompanied with their families. The settlement therefore, would develop upon the lines of a village community or a garden city.

As to the soundness of the settlement, in principle. On this point the experience of sanatoriums is convincing. One has but to bear in mind the many consumptives who for years have been fully employed in the service of sanatoriums, working a full day and earning a full wage, persons who, but for the change in their conditions would long have ceased to be productive workers, to realize that the prime objective of remedial measures should be to give the tuberculous patient the opportunity to live and work under healthy conditions. This fact has long been appreciated, more particularly by sanatorium medical officers. Their difficulty has always been that of finding work for their ex-patients. Though repeated attempts have been made at sanatoriums to create employment other than that provided by the work of the institutions, only most limited successes and many failures have been recorded. The reason is obvious, namely, the inherent difficulty of rendering financially sound any business or undertaking manned with consumptive labour. Herein lies a formidable obstacle which confronts the administrator of a community for the tuberculous. As to the best means of employing the inhabitants of a settlement, the view of this meeting will be of

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much interest. I might add, in passing that having followed most closely the experimental work at the Papworth and Kinson Colonies, the two institutions which most closely approach tuberculosis settlements, I am convinced of the greater possibilities of suitable industries as compared with work on the land. For the development of industries the good will and co-operation of organized labour is essential. In any case consumptive labour needs a substantial subsidy. That this is so, must be self evident.

A word as to finance. Although monetary considerations should not be allowed to weigh unduly when the national health is at stake, as practical persons, we must recognize that settlements must prove costly undertakings, and that before public authorities are likely to embark upon them, they must be convinced that the expenditure involved will represent money disbursed wisely and to the best advantage. Without in any way wishing to anticipate the findings of this meeting I may be permitted to express my opinion that the settlement proposal will make good and that the settlement is destined to be an additional link in our chain of tuberculosis administration. However, further work and experience are needed. For such experiments the present time is most opportune. The problem of the ex-sailor and soldier gives cause for anxious consideration. No less, nay even more than men disabled by wounds and other disabilities, has the consumptive, need for especially favoured conditions. Neither the country nor the Government grudge any expense; the difficulty, as I see it every day, lies in the inability to give practical expression to a fully awakened sympathy. The provision does not exist to cope with a situation which could not have been anticipated. Personal experience convinces me that settlements make a forcible appeal to a large number of ex-sailors and soldiers suffering from tuberculosis. To them a settlement would make all the difference between a life of enforced idleness and one of useful labour; of a prospect of gradual deterioration of health, often under cheerless conditions, and the vista of renewed health under a favourable and inspiring environment.

If it be shown that the settlement is one means by which the country can carry out its obligations to a body of men who have served her well, there can be no doubt that the future will see a similar provision for the civilian population. I repeat, now is the time for well directed experimental work.

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Bacteriological Notes.

BY

ARTHUR COMPTON, M.B., D.Sc.

Demonstrator of Bacteriology in The Royal Institute of Public Health.

CONCERNING THE VITALITY OF THE GONOCOCCUS (V. Morax, *Ann. Inst. Past.*, xxxii, pp. 471-475).—Inoculated as a stab culture in ascitic agar, and incubated at 37° C, the vitality of the colony of gonococcus which results is one year and more. When the temperature is lowered below that at which the microbe can divide and proliferate, the vitality of the microbial element, i.e., the individual life ("vie individuelle") is found not to exceed three to nine days. The latter appears to be fixed and constant for gonococci of a given race: for one three, another seven, and others nine days. The reason why the colony lives so long as twelve and fourteen months in the incubator is because of the slow proliferation of the gonococcus which takes place in the superficial layers of the culture medium at that temperature.

VITALITY OF CHOLERA VIBRIOS (L. Gozony, *Centralbl. f. Bakter.*, lxxxii, 1919, p. 421).—Cholera vibrios conserved in a mixture of equal parts of river water and a 1 per cent. solution of peptone, were found to be alive after five years. Reinoculated on agar and emulsified in saline, these vibrios showed transformation in granules. This transformation disappears after a few subcultures.

ON THE ETIOLOGY OF THE RECENT WORLD-WIDE EPIDEMIC OF INFLUENZA (E. Friedberger and P. Konitzer, *Mediz. Klin.*, February, 1919, p. 108).—Several hypotheses having been put forward to explain the origin of the epidemic, the authors examined five of them: the pathological agent would be the *B. Influenzæ*; the pathological agent would have nothing in common with the B. of Pfeiffer, &c.

Fr. and K. examined carefully the hypothesis of a filtrable virus. To test it they filtered by suction through porcelain filters, sputa, exudates, and other fluids, from actual cases of the disease and from fresh post-mortem material. After assuring themselves of the filtrate, the authors introduced 1/2 c.c. in the form of a spray into the nasopharynx of a number of individuals volunteering for the test. Several persons thus received two inhalations at an interval of eight days, and as a result not one showed any febrile symptoms. Actually one individual had an attack of influenza, but as this came on eleven days after the experiment it was considered to have no connection therewith.

According to the authors, the findings of Selter on the filtrability of the influenza virus are not proven. They believe rather in the existence of some non-microbial damaging agent, of unknown nature, which acts by opening a door to secondary infections.

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An Improved Method for the Isolation of the Coli-Typhoid Group of Organisms from Fæces and Urine.

BY

G. HARPER.

From the Research Laboratories of The Royal Institute of Public Health.

A LARGE variety of methods are in use for the recognition of organisms of the coli-typhoid group. The following method was successfully adopted on a great number of cases and the identification of a double infection, when it existed, was possible. The technique is simple and only entails the labour of making up the necessary material.

Fæces.—A small amount of fæces equivalent to a gramme is emulsified in 10 c.c. of sterile peptone water until an even emulsion is obtained. The tube is then allowed to stand for a few minutes and 1 c.c. of the emulsion is transferred into a tube of sterile peptone water containing 1 in 200,000 brilliant green (peptone water is made in the usual way and sterilized, and when cool the brilliant green is added). A convenient way for making the latter is to make a 0·1 per cent. brilliant green solution in distilled water and add 0·5 c.c. to 100 c.c. peptone water (approximately = 1 in 200,000). The tube is then incubated for twenty-four hours at 37° C. After incubation the green colour will be reduced somewhat. A loopful is then stroked out on a Conradi-Drigalski plate (see Appendix I) and incubated at 37° C for twenty-four hours. The result is that the *B. coli* and other contaminating organisms originally present in fæces are considerably reduced by the brilliant green, while the typhoid and paratyphoids are not, and the plate will show blue colonies if the typhoid or paratyphoid organisms are present. Any *B. coli* are easily recognized as they form red colonies.

Urine.—1 c.c. of urine is pipetted into brilliant green and treated in the same way as the fæces. Having obtained a blue colony the investigation is proceeded with thus: On a clean slide divided into three compartments by grease pencil lines, deposit side by side in each compartment parallel to the pencil rulings two distinct loopfuls of distilled water. A small portion of the blue colony is rubbed up in one of the loopfuls of distilled water in each compartment. Beside the first pair place a loopful of *B. typhosus* serum. Beside the second pair place a loopful of *B. paratyphosus* A serum, and beside the third pair place a loopful of *B. paratyphosus* B serum. We now have a loopful of emulsion

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of the suspected colony, a loopful of distilled water and a loopful of known serum side by side. The slide is then rocked from side to side to allow the three loopfuls to mix and then held up to the light.

If a clumping is observed it will be necessary to test the reaction of the organism on the sugar media shown in the table. The remainder of the colony on the plate is picked off and the following tubes inoculated. An agar slope, a broth tube (this serves for agglutination purposes) and a lactose (see Appendix II), glucose, mannite, dulcite, litmus milk, and litmus whey (see Appendix III) agar tube. Incubate and examine from day to day until the seventh day.

The following reactions are those obtained by the respective organisms:—

	Broth	Agar	Lactose	Glucose	Mannite	Dulcite	Litmus milk	Litmus whey agar	Indol
B. coli ..	Turbid	Slimy, whitish growth	A.G.	A.G.	A.G.	A.G.	A. clot	Slightly red or no change	+
B. typhosus	,,	,,	—	A.	A.	—	A. or Alk.	No change	—
B. paratyphosus "A"	,,	,,	—	A.G.	A.G.	A.G.	A.	No change	—
B. paratyphosus "B"	,,	,,	—	A.G.	A.G.	A.G.	Alk.	Deep blue	—

A = Acid. A.G. = Acid and gas. Alk. = Alkali. — = No change.

The above sugar reactions can be confirmed by agglutinations.

"Double infections" will not be overlooked if small portions of several blue colonies are examined by the slide method of rough agglutination above described. Several specimens of the patient's fæces being examined at an interval of three days, the presence of a second organism, appearing at any time, should thus be easily detected.

APPENDIX I. CONRADI-DRIGALSKI. (Harper's Modification).

The Basis is 1 *per cent. Lemco in Distilled Water.*—**Flask 1: Take** 300 c.c. of aqueous lemco extract. Heat to 80° C. Add peptone 10 grm., casein 10 grm., sodium chloride 5 grm. **Flask 2: Take** 500 c.c. lemco extract (cold). Add powdered agar 30 grm. Mix flasks 1 and 2 into a

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large flask. Steam for one hour. Make the bulk up to 1,000 c.c. with lemco extract. Titrate to plus 3·5 (phenol-phthalein). The medium will then be at about 60° C. At this point add white of egg and shell. Steam for one hour. Filter, and to measured filtrate add: lactose 1 per cent, litmus solution 4 per cent, crystal violet (1 in 1000) 1 per cent. Steam in small flasks for twenty minutes on two successive days. The litmus solution is prepared according to the method described in Muir and Ritchie's Manual of Bacteriology, 1919, p. 50, and is concentrated by evaporating down to about half the original bulk.

Appendix II.

Sugar media of peptone and salt solution titrated to +5 acid reaction (phenol-phthalein) with "fuchsin indicator" in place of litmus solution, and sugars then added are prepared in the usual way. Fuchsin indicator has the advantage over litmus solution by being a much finer indicator and giving a quicker reaction in the sugars.

Fuchsin Indicator.—0·5 per cent of acid fuchsin is dissolved in water. Decolorize with normal NaOH, adding a few drops at intervals of fifteen minutes. As decolorization goes on for some time after the addition of the soda it is important that the neutral point is not exceeded. The fluid should be straw-coloured when neutral but the colour must be gradually obtained. For use with media add in the proportion of 1 per cent.

Appendix III. Litmus Whey Agar.

Heat cow's milk to 37° C. Add 1·5 per cent. essence of rennet. Allow curd to form. Filter and proceed as for ordinary agar. To the measured filtrate add litmus solution as required. Tube 5 c.c. per tube, autoclave at 110° C. for fifteen minutes. Slope tubes. (The colour will return when the medium sets).

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Chemical Notes.

BY

ALAN W. STEWART, D.Sc., A.I.C.

Demonstrator of Chemistry in The Royal Institute of Public Health.

Report of the Government Chemist upon the work of the Government Laboratory for the year ending March 31, 1918.—Code 9205. The number of samples examined for the year was 200,453 against 258,456 the year before. The number of samples of food examined in connection with the supply of the Expeditionary Forces, was 20,020. *Beer:* 275 samples of finished beer from brewers' premises were examined for saccharin, saponin and other prohibited ingredients. None was found to contain any; occasional traces of arsenic occurred. *Beer and Brewing Materials:* 1,469 samples were examined for arsenic. Of these 75 contained more than $\frac{1}{100}$th of a grain of arsenious oxide per gallon, the standard recommended by the Royal Commission. *Tea:* 8,556 samples were examined; of these 1,485 representing 101,573 lb. were condemned on account of sand or other foreign matter. About 7,000 lb. was also reported as unfit for human consumption. These amounts however are not large when compared with the total tea import of nearly 311,000,000 lb. *Matches:* 4 samples were examined for the presence of white phosphorus with negative results. *Condensed Milk:* The percentage of fat in imported samples ranged from 6·5 to 10·9; the samples with the low percentages of fat were taken from consignments of evaporated milk from the U.S.A. The report draws attention to the fact that a considerable amount of the latter class of milk was imported and that it contains a lower percentage of milk solids than that in similar preparations of this country. No preservative was found. *Sterilized Cream:* 14 samples were submitted and the fat varied from 23 to 30 per cent. A platinum substitute was found to be an alloy of nickel, chromium and tungsten.

Estimation of Nitrites (F. Dienert. *Annal. Chim. Anal.*, No. 1, p. 4).—In the absence of ferric salts, free chlorine, &c., the reaction between nitrites and hydriodic acid expressed by the equation: $NaNO_2 + 2HI = NaI + I + NO + H_2O$ may be made use of for their estimation. The nitrite solution is placed in a flask and a current of CO_2, previously washed by passing it into sodium bicarbonate and potassium iodide solution, is led into it for fifteen minutes. Ten c.c. of normal sulphuric acid are now introduced by means of a tapped funnel and the delivery tube of the potassium iodide solution is lowered until the end of it dips into the solution. Owing to the pressure of the CO_2 the iodide solution is forced into the reaction flask; iodine is at once liberated. Add 10 c.c. of 20 per cent. ammonium carbonate, and titrate with $\frac{N}{70}$ arsenious acid. One c.c. of this is equivalent to 0·0002 grm. of nitrous nitrogen.

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Reviews.

Modern Chemistry and Chemical Industry of Starch and Cellulose. By Professor T. C. Chaudhuri, M.A. Calcutta, 1918: Butterworth and Co. (India). Pp. 156. Price Rs. 3.12.

This small monograph has been written with special reference to India and for the benefit of the public. The author gives an excellent survey in short space of the chemistry and various chemical industries that have direct and indirect bearing on starch and cellulose, particularly in the light of recent theoretical and technological researches. The first part of the book deals with the general position of the composition of starch and cellulose from the analytical and synthetical standpoints. The remaining part gives an outline of their numerous technical applications. Incidentally the author indicates where there is room for further studies and industrial expansion, and their possibilities for India. The bold type and headings are a pleasant feature of this excellent little manual.

Transactions of the Sixth International Dental Congress. Compiled and edited by H. R. F. Brooks, J.P., L.D.S. London, 1919: The Committee of Organization, 19, Hanover Square, W. Pp. 753. Price 30s.

The Sixth International Dental Congress was held in London in the beginning of August, 1914, but the publication of the transactions has been delayed owing to the war. The volume now issued includes not only Reports and Papers read by their authors, with discussions, but also others which were contributed, but, owing to adverse circumstances, were not presented. Most of the papers deal with purely technical subjects, but there are a few interesting to those not engaged in dentistry. The paper dealing with the teeth of the Australian and Tasmanian Aboriginals, by Dr. B. Nicholls, will appeal to anthropologists, and that by J. Humphreys contains a very useful summary of our present knowledge of the Evolution of the Human Dentition. Amongst other interesting papers may be noted: Cysts of the Dental System, by Dr. L. Widman of Stockholm; Dental Sepsis as a Predisposing Cause of Cancer, by Dr. F. J. Steadman; Regeneration of the Mandible after Caries and Necrosis, by Dr. H. M. Cryer of the United States. The transactions are well got up and numerous illustrations are incorporated. This book should prove of much value to dentists.

Sanitation in War. By Lieutenant-Colonel P. S. Lelean, C.B., F.R.C.S. London, 1919: J. and A. Churchill. Third Edition. Pp. 368. Price 7s. 6d.

The early appearance of a third edition of the author's work in so short a time is convincing evidence of the popularity it enjoys. As compared with its predecessor it has thirty-three pages more and fourteen illustrations in addition. One of the outstanding features of the Army Medical Service has been that of sanitation; all the essential facts of this are fully described. As before, the text matter is divided in nine chapters, each containing concise and useful information. This handy manual can be recommended as a reliable companion for officers in the Army Medical Service and it will also prove a valuable asset to civilian practitioners in remote parts of the Empire.

Kala-Azar: Its Diagnosis and Treatment. By Ernest Muir, M.D., F.R.C.S. Calcutta, 1918: Butterworth and Co. (India). Pp. 37. Price Rs. 2.

The author's object in writing this little book has been to place at the disposal of medical practitioners in small towns and villages, a guide to the diagnosis and treatment of Kala-Azar. Until a few years ago this disease usually ended fatally, but since the introduction of the treatment by intravenous injection of soluble antimony salts, recovery is the rule rather than the exception if treatment is commenced in time and effectively carried out. The text matter

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is divided into two main parts, viz., Diagnosis and Treatment. Sir Leonard Rogers, who has written a foreword, recommends the use of sodium antimony tartrate in preference to the potassium salt as it was found that the latter when kept in solution for a few days produces a very toxic form. Practitioners in the East will find this a helpful guide as the technique of various operations such as spleen puncture and the intravenous injections are fully and clearly described.

Medical Bacterioloy. By Professor John A. Roddy, M.D. Philadelphia, 1919: P. Blakiston's Son and Co. Pp. 285. Price $2.50.

This volume is intended as a text-book for beginners and laboratory guide for medical practitioners and pharmacists. The author gives a brief and clear description of the more common pathogenic micro-organisms and the technique adopted in bacteriological laboratories. Owing to the frequency with which valuable new facts are discovered and new tests and technique devised in bacteriology, Professor Roddy rightly emphasizes the fact that it is imperative for bacteriologists to read current journals on that subject. New information has been published on the meningococcus, and the paratyphoid and dysentery groups, since this book was published, and in the agglutination test, using the patients' serum in Malta fever and dysentery, the author considers as diagnosis a much lower dilution of serum than is usually accepted. The work is well produced and there are thirty-eight good illustrations and eight excellent coloured plates. Medical students and others reading up bacteriology for an examination subject will find this book helpful, as it is clearly and concisely written.

Technical Handbook of Oils, Fats, and Waxes. By Percival J. Fryer, F.I.C., and Frank E. Weston, B.Sc. Vol. II. Practical and Analytical. Cambridge University Press, 1918: Fetter Lane, E.C.4. Pp. 314. Price 15s.

We had occasion recently to favourably review the first volume which dealt with the chemical and general aspect of the subject. The present second volume is concerned with the practical examination and analysis of the natural and hydrocarbon (mineral) oils, fats and waxes. It is intended as a handbook of practical methods for the use of technical chemists and others concerned in the examination of oils and kindred substances. The requirements of students have not been overlooked and there is evidence throughout to show they have been taken into account. An excellent feature of the work is the illustration by direct photographs of apparatus employed in the more important operations. The information is given in a succinct and intelligent manner, and only trustworthy methods are described. Many of the available tests, however, are quite empirical. The book is arranged in ten sections and we can cordially recommend it as a reliable guide to analysts and technical chemists, who will find it of much value and assistance.

Materia Medica and Therapeutics. By J. Mitchell Bruce, M.D., F.R.C.P., and Walter J. Dilling, M.B., Ch.B. London, 1918: Cassell and Co. 11th edition. Pp. 675. Price 9s.

The fact that this book has now reached its eleventh edition may be considered as an indication of the popularity it deservedly enjoys. The present edition has been revised to correspond with the war amendments which were imposed owing to the necessity of economizing such substances as glycerine and sugar. These restrictions have happily now been withdrawn, so that war emergency formulæ will no longer be necessary. This manual has been revised throughout in the light of the most recent advances in Pharmacology and Therapeutics. Some forty new remedies are noticed, and thus certain subjects such as electric treatment, massage, exercises have been amplified. Knowledge gained from the war on the subjects of antiseptics and surgical dressings has been incorporated. The text-matter is clear and concise, and the bold headings, which are a feature of this book, make reference easy to the various drugs. This is a useful and well-written guide to materia medica and therapeutics.

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Volume XXVII. OCTOBER, 1919. No. 10.

HOUSING IN RELATION TO NATIONAL HEALTH FROM THE MEDICAL ASPECT.[1]

BY

PROFESSOR E. W. HOPE, O.B.E., M.D., D.Sc.

Medical Officer of Health for The City and Port of Liverpool.

FROM time to time the bodies engaged in one or other of the problems of Local Government are stimulated, and possibly assisted, by a wave of general interest which temporarily awakens public opinion on some question which for generations has engaged the attention of thinking members of sanitary authorities. The value of these revivals depends upon the care with which they are fostered and taken advantage of: they are not lasting, and they soon wither before the difficulties of achievement.

The problem which is now taking its turn in this ephemeral public interest is the Housing Question, not for the first time—remember the fashion a few years ago of Society Slumming, a fashion which, so far as I am aware, did not replace a single hovel in town or country with a decent sanitary cottage—but there is reason to hope that it will now be more productive of result than many of the similar interests which appeal from time to time to the public, the reason for such expectation being that the shortage of houses of every kind, wholesome and unwholesome, is no longer an infliction upon one class of the community but, to a certain extent, is felt by all. The causes are obvious: building operations have been entirely suspended for five years, the large growing centres of population which built 1,000 new houses annually to meet their growth have had none at all; each of these therefore is 5,000 houses short, and every district large or small has its shortage in the same proportion, even without taking into account the large number necessary in urban and rural areas alike to replace those admittedly unfit for human habitation, or occupied under conditions prejudicial to health. It has fallen to my lot during the last twenty or twenty-five years to have been officially requested to report upon conditions affecting housing in many of the most important of the large towns in England, Scotland and Ireland, and I am aware of the efforts made to grapple with the problem of the reconstruction of insanitary

[1] A paper read at the Conference on "Housing in relation to National Health," at the Guildhall, London, on June 27, 1919.

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areas, which are the "heritage of woe" bequeathed by bygone generations. Whilst acknowledging that all cities possess areas equally bad, I think it well to confine to Liverpool the few remarks I have to make on this head, because it is the city which I know most intimately. I may say that all insanitary areas are characterized by the same features in regard to destruction of life, child neglect, infant mortality and general degradation; in former years great outbreaks of cholera, typhus and other zymotics, forced notoriety upon the localities. It is strangely significant that the doubt is sometimes raised as to whether it is actually the *structural* conditions which do really tend to these associations, or whether it is not the fact that the slums are created by the habits and customs of the people themselves: whether, really, it is not drunkenness, idleness, and vice which are responsible for them. This proposition is more frivolous than appears on the face of it. I do not doubt that drunkenness, idleness and vice will lead those who are fond of them to the deepest depths of insanitary misery which the slum areas of cities afford, but that they cannot have the least influence upon the original vicious structural state is plain—which is enough for our present purpose; that the habits and life of the occupants contributed to their melancholy condition is probable, but, be that as it may, they were habits of life peculiar to the localities and really constitute one more terrible indictment against them. In presentments of property of this kind, in no single instance over the whole thirty years of my experience has any medical man been found who would be willing to come forward to say a word in favour of the continued occupation of dwellings of this class, and needless to say many efforts were made to get them in the earlier years, but without success.

The housing peculiarities of Liverpool resulted from the sudden prosperity and rapid development about a century to three-quarters of a century ago, which led to the building of great numbers of houses, built side-by-side and back-to-back with one another, and arranged in narrow courts and blind alleys, so placed as to ensure the greatest possible number being erected on the smallest possible space, the financial interests, or avarice, of landowners being unfettered by any Parliamentary restrictions. Upwards of 22,000 such tenements were left as a legacy to future generations to apply the only effective remedy, viz., demolition. The cost of this, and the additional task of finding dwelling places for the dispossessed

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fell mainly upon the present generation. The burden was met largely by private enterprise which ensured the gradual peripheral expansion, and afforded opportunities for a levelling-up, of which thousands of families were not slow to avail themselves. These Liverpool slums, be it remembered, were slums from their conception, they were not degenerate palaces nor former homes of merchant princes; unlike those, say, of Edinburgh or Dublin, there was no sentiment of romance which I ever heard of associated with them, no halo given by former occupation by a Scottish noble, nor occasional visitation by a Scottish queen, or an Irish peer; their records were of squalor, disease and mortality, of perennial outbreaks of infection, interesting from an epidemiological standpoint, but an interest calculated to hasten rather than delay their unpitied destruction. The great necessities of Liverpool led her to seek from Parliament powers which would be helpful in dealing with the mischief, and just as the Liverpool Housing and Town Planning Act preceded and was the forerunner of the General Housing and Town Planning Act, so the earlier petitions to Parliament were the basis and foundation of the English Public Health Act.

The procedure under earlier Parliamentary powers involved amongst other things a presentment of the property which was considered by the Medical Officer of Health to be unfit for human habitation to the Grand Jury at Quarter Sessions. This enabled the various owners concerned to state their case through members of the Bar, of which full advantage was taken, and the opposition to demolition had the effect of firmly establishing and recording the indictment against the property, showing clearly that it had in fact been an experiment of a destructive kind upon generations of unfortunate tenants. The property has slowly melted away under successive Acts of Parliament, each of which made procedure easier and cheaper, and at the present time only some 2,000 of this particular type of insanitary dwelling remain. One trifling but interesting incident I will mention in regard to them; about twenty years ago the City Parks and Gardens Committee were brightening other parts of the city with flower boxes, and a supply was given to these court houses, but the practice was suspended because nothing of that kind would grow in such uncongenial surroundings.

Turning to the effects of the reconstruction of these areas and to the comparative vital statistics of the past and the present, I shall trouble you with only a very few figures, but it must always be

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remembered that it is only those who have been dispossessed from the insanitary dwellings who are catered for, and no other tenants —with negligible exceptions—are accepted. The figures are as follows :—

TABLE "A."—AVERAGE VITAL STATISTICS IN REFERENCE TO HOUSING AREAS DEALT WITH.

	Average of 3 years in insanitary areas	Average of 3 years (1916-7-8) after reconstruction	Average of 3 years (1916-7-8) whole city
Birth rate	45·0 est'd.	40·1	23·8
Death rate	37·0	26·6	18·0
Infant death rate ..	259·0 est'd.	162·0	119·0
Phthisis rate	4·0	1·9	1·7
Zymotic rate	4·0 est'd.	—	2·0

TABLE "B."—VITAL STATISTICS. ALL CORPORATION DWELLINGS.

Population,	1914 ..	10,545
,,	1915 ..	11,393
,,	1916 ..	11,334
,,	1917 ..	11,897
,,	1918 ..	12,139

	1914		1915		1916		1917		1918	
	Total number	Rate per 1,000	Total number	Rate per 1,000	Total number	Rate per 1,000	Total number	Rate per 1,000	Total number	Rate per 1,000
Births	601	56·9	524	45·9	462	46·7	462	38·8	424	34·9
Deaths ..	304	28·8	307	26·9	327	28·8	259	21·7	358	29·4
Infant mortality. Deaths under 1 year	106	176·3 per 1,000 births	95	181·2 per 1,000 births	75	162·3 per 1,000 births	70	151·5 per 1,000 births	73	172·1 per 1,000 births
Phthisis ..	13	1·2	20	1·7	22	1·9	18	1·5	27	2·2

During the year 1918 there were 33 deaths from influenza and 98 from pneumonia.

It is extremely gratifying to notice also the improvement in the habits and cleanliness of these people, as indicated by their own appearance and that of their dwellings. The changed conditions can only be appreciated by those who are conversant with the localities prior to the operations of the Housing Committee of the Liverpool Corporation. A walk round these improved districts during the day or night will indicate the atmosphere of quietness and comparative comfort which prevails, as contrasted with previous discord and disorder; the well-lighted rooms of the tenements present a cheerful appearance, and the improvement extends beyond the immediate vicinity of the dwellings, and affects the general condition of the neighbourhood. Prosecutions for

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drunkenness and assault have decreased almost to a vanishing point. There is a general feeling amongst the occupiers of the Corporation tenements that it is a privilege to dwell in them, and, although in many cases tenants are poorly off, efforts to improve the internal arrangements of the dwellings are surprisingly successful. Self-respect is more in evidence, and a keener love of home prevails. The condition of the children shows a very marked improvement; they are better cared for, suitably clothed, and are being reared and trained in an environment which is bound to be productive of much moral and physical good.

Those who wish fuller information will find all the points set out in successive Annual Reports on the health of the city, in which these matters are treated.

There is a pathetic interest in the views from time to time put forward by distinguished writers whose opinions we respect, who question the wisdom of the action of sanitary authorities. We are told that we are preserving a bad stock, that we are keeping, breeding, and multiplying the feeble, the mentally ill-balanced, the vicious and the degenerate, and committing other errors equally detrimental to the race. How far all this is from the truth!

The high birth-rate is a favourable indication of the renewal of humanity, just as the lowered infant mortality is a favourable indication of national virility.

We must not forget the lessons of history: turn for a moment to one; the ancient nation, brave in war, pre-eminently distinguished in literature, science, art, philosophy, sculpture, and which, moreover, paid the greatest possible attention to individual physical development, as witness the Olympian games, decayed away because it fostered restrictions upon its own renewal, fearing to reproduce more than could live up to the high standard ideal of comfort; to further ensure this the practice of infanticide was countenanced by its philosophers and widely practised. In consequence the nation becomes numerically incapable of resisting the onslaughts of the enemies which destroyed it. Contrast with this another ancient race characterized alike by high productiveness, and by the extreme care of its young. Oppressed and persecuted by many nations century after century, yet it is to-day stronger, richer, numerically larger and more distinguished than ever before in its history, whilst the nations which were its greatest oppressors have vanished from the earth. The housing

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question is inseparably mixed up with the welfare of infancy, and the welfare of the race, and all of those who regard these things as important must see that so far as they can bring it about the present wave of interest shall carry real improvement, and not be allowed to die down so soon as public sentiment and fashion turn to some other object.

Among the most important points to insist upon are that we must build in reasonably open salubrious districts, and that they can be readily approached by cheap and rapid trams or other means of transport—we must be very chary of rehousing people in the heart of densely built-up cities, which, appropriately, are occupied by commercial and business operations. Satisfactory as our results may have been from the policy of rehousing the dispossessed upon the sites of their former dwellings, I have had no reason to modify the views consistently expressed for five-and-twenty years that the better course is to look to available areas in the suburbs. In the Annual Report for the year 1899, I made the following observations: "There are many instances in which small congested insanitary areas are being gradually replaced by the extension of business premises, warehouses, &c.; this growth of commercial requirements has in some cases entirely altered the character of the districts, and while it has enhanced the value of the site for business purposes, has lessened its suitability for dwellings. It may, no doubt, be physically possible to erect suitable cottages, each with thorough ventilation and open yard space, upon some of these sites, yet the fact that warehouses tower above them, obstructing ventilation and curtailing the amount of light and sunshine, render them far less desirable than cottages of equal character in the outskirts. The medical officer would again take occasion to express his belief that the best interests of the labouring classes—those for whose benefit the work is undertaken—will be served by housing them, so far as circumstances will permit, in more open localities in the suburbs. It is generally considered that the dwellings intended to replace the insanitary ones should be provided upon the original site or in the immediate vicinity, in order that the occupants may not be removed to a distance from their work. It is incorrect, however, to assume that the occupants of congested insanitary areas *are* living near their work; as often as not they work at very considerable distances away, and hence the removal from those districts would in many cases be advantageous not only

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from the sanitary but from the business point of view. The projected advances in the means of locomotion between the centre and the outskirts of the city will shortly place within reach of the labouring classes the advantages of living away from the congested centres of the city, and at the same time being within easy and cheap access of their work, wherever it may be."

In 1906, urging the same point, the following recommendations were made: "In reference to the question of erecting dwellings for the dispossessed away from the congested areas where so much space is absorbed by offices, warehouses, and other commercial buildings, it is plain that sooner or later a limit to the possibilities of rebuilding in the densely populated parts of the city will be reached, and the necessity for the surplus population going elsewhere will arise. It must be remembered that the dispossessed are amongst the most prolific section of the population, and increase very rapidly. Various areas in the more open outskirts of the city present facilities for labourers' dwellings, both as regards site, elevation, and proximity to churches, chapels, schools, and shops of the class used by the labouring population and their families, as well as by reason of the great facilities for transport to the workplaces which are afforded by the tramway service or by rail. These sites are superior in every way from a health point of view to any of the sites in the more densely populated centres."

Following upon my recommendations, the Housing Committee at a later date expressed the following view:—

"The Committee consider that for the present at any rate their work must be confined to housing the dispossessed within a reasonable distance from their work; they are, however, strongly of opinion that it would be to the material advantage of a considerable section of the labouring classes who are about to be displaced if they and their families could be housed in the suburbs. From the sanitary point of view there can be no two opinions on this point." Hitherto, however, circumstances have interposed to prevent the latter part of these views being given effect to.

In conclusion I may point out that the expectations which may justifiably be entertained in regard to the Housing and Town Planning &c., Bill now before Parliament, rests upon certain outstanding features, the first of which is the obligation it imposes upon every Local Authority to consider *the needs* of the area with respect to the provision of houses for the working classes, and to

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prepare within a limited period a scheme for the exercising of their powers under Part III of the Housing of the Working Classes Act of 1890. The need arises not only from the cessation of building, and from the necessary demolition of insanitary houses, but to prevent overcrowding consequent upon the provision of accommodation for washing, cooking, food storage, &c., contemplated in sublet houses. Geographical location on account of industrial expansion must be remembered. I am not attracted by converted buildings, owing to the difficulties of a suitable conversion, even when such buildings are in suitable situations.

The second obligation upon the Local Authority is to carry that scheme into effect within a specified time, failing which the County Council and the Local Government Board have power to act.

A spur of this character must ensure action of some kind, even on the part of the least progressive of Local Authorities, and the financial aid, together with the powers proposed for the Local Government Board, are so ample and the discretion to Local Authorities in preparing their schemes so wide, that the pathway is cleared for an immense advance.

Above all, however, the spirit which is abroad, and which cannot be expressed in the clauses of an Act of Parliament, will ensure progress; with progress on proper lines the new houses will provide all the necessaries and attractions of domesticity and the augury for the future success of the scheme is good. The facilities proposed for the acquisition of land, as well as the acquisition and altering of existing houses or buildings, will be most valuable to Sanitary Authorities. Past experience suggests the value and the sense of the provisions in the Bill for encouraging the erection of houses by Public Utility Societies and Housing Trusts, measures which should not in any way check private enterprise in meeting the needs of certain sections of the community. The Bill also recognizes the necessity for more stringent prevention of the re-letting of houses already closed under Closing Orders.

Finally, the importance of "getting a move on" is recognized also in the modification of procedure in regard to Town Planning Schemes, which will result in a saving of valuable time, so that there can be no doubt that the Bill in these and in other directions will prove a valuable addition to existing legislation upon the subject.

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A SCHEME OF TREATMENT OF TUBERCULOSIS.[1]

BY

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THE necessity for a careful reconsideration of the problem of tuberculosis, and of the important questions of prevention and treatment, is emphasized by the striking increase in the number of deaths from this disease which has taken place since the outbreak of war. This increase is not characteristic of any particular part of the population, but is alike a feature of the fighting forces, the civilian population and the inmates of large institutions, especially asylums. In 1914 the number of deaths in England and Wales from all forms of tuberculosis was 50,298, in 1916 53,586, in 1917 55,934, and last year the number had increased to 58,073. In one large asylum which has recently come under my own observation, the death-rate from tuberculosis in 1914 was 2 per cent., in 1918 it had reached the high figure of 11·7 per cent. The reason for this very striking increase in the number of deaths from tuberculosis is to be attributed to conditions inseparable from a prolonged European war. The history of the last four years compels us to arrive at the conclusion that the reserve of resistance to tuberculosis possessed by the population of this country presents much too small a margin to give rise to any sense of security. There is in consequence little or no prospect of the effective control and final abolition of this disease until we have had in operation for an extended period of time a far-reaching and comprehensive scheme which will include adequate and efficient measures of prevention and treatment. At the outset a case of tuberculosis comes under the observation of the Tuberculosis Officer or the medical practitioner, and has to be notified to the Medical Officer of Health. Now one of the weakest links in existing schemes is the present method of notification. It conveys no information regarding the type of the disease, the extent to which there exists a danger of infection, or the home

[1] A paper read at the Conference on "The Tuberculosis Problem under After-war Conditions," at the Guildhall, London, June 28, 1919.

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conditions and circumstances of the patient, and it places no initial responsibility on the medical practitioner with regard to these important points. The services of the medical practitioner in relation to the prevention of disease require to be more extensively utilized, and one of the first steps necessary is an alteration in the present method of notifying tuberculosis, so as to enable the medical practitioner to supply fuller information to the Medical Officer of Health regarding the type of the disease and the circumstances of the patient.

The various units which are necessary to build up a comprehensive scheme for dealing with tuberculosis are well known. They include dispensary, sanatorium, hospital, colony, domiciliary treatment, open-air school, after-care and preventive measures, and it is proposed to consider them separately and to discuss their function and position of relative importance. In the past well thought out schemes of treatment have suffered because too much importance has been attached to certain units while others have received scant consideration, with the result that our efforts have been limited in scope and have been restricted to dealing for the most part, and that inadequately, with certain types of the disease.

The first essential unit of the scheme is the dispensary, which must be connected in an intimate working relationship with the medical practitioner, the hospital and the sanatorium. In large urban districts where the local authority is the authority for dealing with tuberculosis, the central dispensary and the tuberculosis hospital should be linked together. The function of the dispensary is to serve as a centre for diagnosis, treatment, observation and dissemination of knowledge with regard to preventive treatment. It should provide, either directly or indirectly, facilities for the bacteriological examination of the sputum, &c., and for X-ray examination. Dispensary treatment has received considerable adverse criticism, but it is not sufficiently realized by those who offer such criticism that the continuous observation of a tuberculous patient plays an important part in relation to both prevention and treatment, and that the success of the dispensary depends in large measure on the extent to which adequate provision is made for the immediate admission of patients to hospital or sanatorium. It is necessary that the medical practitioner should be brought into closer working relationship with the dispensary, so as to provide for the linking up of dispensary and domiciliary treatment, and to enable

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the medical practitioner to take full advantage of the facilities offered at the dispensary with reference to diagnosis and treatment.

The second unit of the scheme, and in many respects the most important one, as it aims equally at prevention and treatment, is the hospital for the treatment and segregation of acute and advanced cases of tuberculosis. No scheme for dealing with tuberculosis can be regarded as complete, or be expected to secure satisfactory results, unless it includes adequate accommodation for acute and advanced cases of the disease. In carrying out the hospital treatment of pulmonary tuberculosis certain definite difficulties have to be faced. Patients will frequently refuse to go to the hospital or when admitted they will decline to remain. In the absence of compulsory powers of removal, the only method by which such difficulties can be overcome is to provide an up-to-date institution on open-air lines with an efficient medical and nursing service. When patients come to realize that the hospital for pulmonary cases has an essential place in the scheme of prevention and treatment, and that the acute case, if and when it becomes quiescent, is immediately transferred to the sanatorium, the objections raised to the admission to, and retention in hospital are reduced to a minimum. If, however, we provide institutions which are commonly called "homes for the dying," or hospitals for incurables, thus publicly proclaiming the fact that we regard the case as hopeless before the patient is admitted, we shall be unable to solve the difficulty without compulsory powers of removal, and even with such powers the results will be unsatisfactory. One important function of the hospital is to provide for the treatment of certain active types of the disease by continued rest in bed. There is, I fear, some evidence that we have forgotten the teaching of Marcus Patterson as to the fundamental importance of rest in bed in the successful treatment of active tuberculosis. Without adequate hospital accommodation such rest cannot be secured while active cases of the disease are of necessity sent to the sanatorium, with the result that the utility of the sanatorium is impaired. The success of the hospital treatment of pulmonary tuberculosis depends upon certain conditions, chief of which are adequate and suitable accommodation, compulsory powers of removal, where necessary, central position of hospital, a high and sustained standard of treatment and nursing, and the immediate interchange of patients between the hospital and sanatorium when such is indicated.

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The next important unit of the scheme is the sanatorium, with which should be combined facilities for the industrial training of patients. Sanatorium treatment has received, and continues to receive, much adverse criticism, and there is no doubt that it has not yielded the results which were at one time anticipated; but this is due to the fact that too much has been expected from it alone, and that the dependence of the success of sanatorium treatment upon the adequate and efficient provision of other units of treatment has not been sufficiently appreciated. It must also be admitted that the standard of sanatorium treatment throughout the country leaves something to be desired both with regard to uniformity and efficiency. We cannot, of course, standardize sanatorium treatment, but there are certain broad principles relating to such important questions as temperature, rest, and graduated labour, which, it is desirable, should be uniformly adopted. The immediate results of sanatorium treatment are good, and there is no other form of treatment at present known which, in suitable and selected cases, so successfully arrests the onward progress of pulmonary tuberculosis. The advantages of combining the industrial colony with the sanatorium are so obvious that no extended argument in favour of such a recommendation is necessary. If adequate hospital accommodation is provided for the more acute and more advanced cases, it is obvious that we raise at once the physical standard of the sanatorium patient, with the result that we minimize the difference between the sanatorium and the colony patient. There are also the advantages of economy with regard to building and administration, and of the provision of a more suitable and more extended site for the sanatorium. Lastly, the question of manual labour, which is an essential part of sanatorium treatment, should be viewed from the economic standpoint, and in relation to a system of training which may subsequently be of value to the patient. No patient should be discharged from a sanatorium so long as there exists any possibility of further improvement, and while there is no prospect of immediate return to satisfactory home conditions and to some form of employment suitable to his capacity for work.

In considering the question of sanatorium treatment reference must be made to the requirements of children. The type of pulmonary tuberculosis commonly met with in adult life is rarely seen under the age of 15—the more common form in children

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being latent root tuberculosis most probably of bovine origin. It is, of course, impossible to provide a separate institution for every particular type of the disease, and provision for the sanatorium treatment of children should therefore be made in existing institutions which are adapted, or may be adapted, for the purpose, or in a special block in the sanatorium for adults when the size and character of the site permit.

The following conditions must be fulfilled if sanatorium treatment is to yield permanently satisfactory results: (1) A high and uniform standard of treatment. (2) The selection of the early and arrestable type of case. (3) Adequate accommodation. (4) Early admission. (5) Prolonged treatment with training in suitable occupations. (6) An official scheme of after-care. (7) Healthy home conditions and an adequate and efficient standard of the allied units of treatment.

I have referred to the hospital and sanatorium treatment of pulmonary tuberculosis. It is now necessary to consider the hospital treatment of surgical or non-pulmonary tuberculosis. The absence of adequate and suitable provision for the conservative treatment of this type of the disease constitutes one of the weakest links in existing schemes of treatment. The results obtained by the modern conservative method of treating non-pulmonary tuberculosis are excellent both with regard to recovery and the prevention of deformity, and well repay the cost incurred; although, if the best results are to be obtained, a prolonged term of treatment is essential, extending not infrequently to a period of years. At the present time provision for such treatment is made in special hospitals, in large general hospitals, and in the smaller hospitals in county districts. Experience has shown that, by far, the best results are obtained in the special hospitals where primary importance is attached to conservative treatment, while the results obtained in the smaller hospitals in county districts are, as a rule, better than those obtained in the larger general hospitals. It is necessary, therefore, if non-pulmonary tuberculosis is to receive adequate and efficient treatment that large special hospitals should be provided in suitable localities, each hospital of sufficient size to meet the requirements of a large area and of a considerable population.

I come now to the consideration of the domiciliary or home treatment of tuberculosis, a form of treatment which is essential

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to the efficiency of the scheme and of great importance in relation to prevention. The present system of domiciliary treatment is unsatisfactory, and requires to be reconstructed. If a high standard of domiciliary treatment is to be attained, two conditions have to be fulfilled. There must be an adequate and efficient medical and nursing service, and there must be satisfactory home conditions. There is need for a more uniform method of carrying out domiciliary treatment according to well-defined rules, while payment for medical service rendered should be made on a combined capitation and per visit basis. A special formulary is desirable, and there should be greater facilities for the medical practitioner to provide without delay the necessary requirements for preventive and curative treatment. The question of housing tuberculous patients so as to enable efficient domiciliary treatment to be carried out is a difficult problem, and is one which demands immediate attention. Efforts should be made to provide housing accommodation for persons with arrested tuberculosis in houses on a dry subsoil near open spaces, built with a view to secure a maximum of sunshine and fresh air. Plans have been issued by the Local Government Board which show an excellent type of house for tuberculous patients. There is some tendency at the present time to advocate a distinct cleavage between preventive and curative treatment; this is neither practicable, nor is it desirable. In the domiciliary treatment of tuberculosis the services of the medical practitioners are required to treat the individual; but such services could be much more extensively used than they are at present for the carrying out of measures aiming at the control and prevention of the disease.

The provision of open-air schools is regarded as essential to a complete scheme for dealing with tuberculosis. It is necessary, however, that we should exercise some degree of caution with regard to the provision of special open-air schools which in themselves will do little to prevent tuberculosis if insanitary areas and homes are allowed to exist, and if children are permitted to drink milk containing the bovine tubercle bacillus. If, on the other hand, the hygienic standard of home life is raised, if children are well fed and if a pure milk supply is provided, and, further, if existing schools are efficiently warmed, ventilated and cleaned so as to conform more closely to our conception of what an open-air school is, then the demand for the provision of this particular type of school on any extensive scale will practically cease to exist. In

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existing schools, both in urban and rural districts, the provision of open-air class rooms and open-air instruction is now made, and such provision could, with advantage, be developed to a much greater extent than it is at present. In the case of children with definite tuberculosis who are sent to hospital or sanatorium, and for whom a prolonged term of treatment is essential, facilities for open-air instruction must necessarily be provided. Children with root tuberculosis respond well to treatment, especially when they receive a sufficiency of suitable food, including fats. If the temperature is normal and there are no definite localizing symptoms or physical signs, such children invariably improve in health and increase in weight under dispensary treatment while at the same time attending a public elementary school.

I now come to the consideration of an important supplementary unit of tuberculosis schemes, namely, after-care. Tuberculosis is a disease which presents a wide variation in type. The tubercle bacilli may remain entrenched in lung, bone or lymphatic gland for years, and although apparently asleep, they may ultimately wake up and give rise to the train of symptoms so characteristic of the disease in its active form. The treatment of the disease in hospital or sanatorium must therefore be supplemented by efforts to place the patient under conditions of life which are calculated to prevent relapse and disability. This is the function of after-care. It aims by means of advice and assistance with reference to housing, food, clothing, employment, etc., to safeguard the beneficial results obtained by treatment, and to maintain the patient's capacity for work. The after-care of tuberculous patients has in the past been carried out through the agency of voluntary care committees, and much excellent work has been done by such committees, but the time has come when after-care must be included as a supplementary part of official schemes so that financial assistance may be available to secure effective sustained and uniform action. Included in the scheme of after-care there must be an employment and emigration bureau to assist patients who are able to work and who are unemployed, or unsuitably employed, to find suitable occupation and to provide facilities for emigration in the case of able-bodied patients with arrested disease who desire to seek a drier climate. It is a sound economic policy to place the individual suffering from tuberculosis, who has received substantial benefit from treatment, under conditions of life which tend to preserve his health and maintain his capacity for work at their highest possible level.

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These various component parts of what may be regarded as a complete scheme of treatment will not, however, solve the problem of tuberculosis unless they are supplemented and reinforced by scientific investigation and by a complete scheme of prevention. Prevention and treatment must go hand in hand, and indeed are frequently inseparable, as instance the case of the hospital treatment of pulmonary tuberculosis. It is of the greatest importance that while treating actual cases of the disease, every effort should at the same time be directed towards preventing its development by promoting conditions which will raise the standard of resistance to tuberculosis and will restrict the output of the tubercle bacilli. Viewing the position with regard to tuberculosis after the stress and strain of five years of war there is urgent need for immediate preventive action in four main directions, as follows: (1) the provision of an adequate supply of food, including fats, at reasonable prices; (2) the abolition of insanitary houses and the raising of the hygienic standard in the home, especially with regard to ventilation and cleanliness; (3) the segregation of advanced cases of the disease and (4) the provision of a milk supply free from tubercle bacilli.

Pulmonary tuberculosis is a house and dust disease. It is in the damp, ill-ventilated, sunless and dusty houses that the bacilli of tuberculosis live and flourish and where the human soil is prepared for the sowing of tuberculous seed. Non-pulmonary tuberculosis is frequently a milk-borne disease. These facts indicate the direction in which preventive action is called for. Tuberculosis may be defined as the morbid expression of conditions of life incompatible with a high standard of health and physical vigour. The hygienic and sanitary standard of communities throughout the world varies within extreme limits. When this standard reaches a low level it finds expression in the presence of certain acute specific diseases such as small-pox, cholera, typhus and enteric fevers. In this country we had before the war reached a comparatively high standard, as these diseases, except for accidental outbreaks, were rarely met with, but we had not yet reached the level which provides an adequate measure of resistance to attacks by tuberculosis. If the pre-war standard is to be regained and exceeded we must have the practical application of the scientific knowledge we possess with reference to the prevention of disease and the maintenance of an ordered state of social life.

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It is necessary, therefore, that tuberculosis should be viewed not merely as a disease or morbid condition but as an important index of the health standard of the community. How adversely certain social and economic conditions may influence our resistance to this disease the present war has clearly demonstrated. There is, therefore, much leeway to make up and the control of the disease cannot possibly be secured without the expenditure of much thought, effort and money. But the results eventually obtained will well repay the cost involved, provided the scheme is sane in application, comprehensive in scope and unified in effort, for the measures which are recognized as essential for the prevention of tuberculosis are also instrumental in raising the general standard of health and in protecting the individual from other forms of disease.

In conclusion I submit the following as essential units of a complete tuberculosis scheme:—

(1) An improved method of notification to provide fuller information regarding the type of the disease and the circumstances of the patient.

(2) An efficient and co-ordinated system of dispensary and domiciliary treatment.

(3) The provision of adequate hospital accommodation for acute and advanced cases of tuberculosis with compulsory powers of removal.

(4) The provision of up-to-date sanatorium accommodation combined with facilities for the industrial training of patients.

(5) The provision of large hospitals for the conservative treatment of non-pulmonary tuberculosis: each hospital to serve a large district and population.

(6) The provision of sanatorium accommodation for children and of facilities for open-air instruction in connection with hospital, sanatorium and schools.

(7) The incorporation in the scheme of an after-care unit with an emigration and employment bureau.

(8) And lastly, the carrying out of a comprehensive scheme of scientific investigation and preventive effort with a view to the control and final abolition of tuberculosis.

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THE SOCIAL CARE OF THE CHILD.[1]

BY
LADY LESLIE MACKENZIE, F.E.I.S.

THE nation seems at last to have awakened to the fact that children ought normally to grow up into men and women. For eight or ten years now, medical inspection has shown us that the health of the mass of the school children leaves much to be desired. Health Insurance Committees are realizing the same facts about the young men and women of insurance age. The medical examination of both men and women for the services showed that first-rate physique and excellent health were, in many instances, not the strong points of the recruits. Our Prime Minister has appealed for an A 1 race; that cannot arise from C 3 infants. Do we all realize this fact and what are we doing to alter it?

The Notification of Births (Extension) Act of 1915 made it possible for all Local Authorities for Public Health "to make what arrangements they see fit for attending to the health of expectant mothers, nursing mothers and children up to five years of age." Did ever any local authority get a freer hand? The need for these "arrangements" is clamant everywhere. The babies are not all born in one corner, nor are they all sick in one corner, nor do they all die in one corner. The birth-rate, the death-rate, the disease-rate and the damage-rate are fairly distributed throughout the chief centres of population, and, to meet these conditions, every local authority is encouraged to make the necessary "arrangements" or schemes. The nation now accepts the fact that it has become necessary to keep alive every child that is born alive. That being so, action is necessary not along one line, but along every possible line, to maintain the health of the mother and child before, at and after the birth, to the end of the child's first year. To secure this, local authorities should see that sufficient institutions exist to meet the requirements of their population. Such institutions should include consultation centres for expectant mothers, hospital beds for complicated pregnancies, out-patient clinics for specific illnesses and common ailments of

[1] A paper read at the Conference on "Maternity and Child Welfare," at the Guildhall, London, June 27, 1919.

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pregnancy, as well as lying-in homes for difficult or complicated confinements, and for confinements that would have to take place in unsuitable homes. One often wonders whether the community realizes the number of stillbirths and maternal deaths that could be prevented if the local authority made arrangements appropriate to their child-bearing population. The baby, when born alive, deserves its chance to keep alive; and to help towards this there should be baby clinics or infant consultations where the babies may be regularly weighed and examined, and where advice may be given to the mothers on the proper management of their children in sickness and in health. There should also be milk depots and properly prepared milk for infants of all ages where breast feeding proves impossible; and regular home visiting by well trained health visitors. All these institutions and arrangements must be under the care and supervision of medical men or women, with the assistance of trained midwives, nurses, and health visitors; and they must be conducted to the satisfaction of the medical officer of health of the district.

We have heard much of the activities and arrangements made in towns for the protection of infancy; but we have also to think of the country places where, for the time, there are no such agencies and where it is extremely difficult to provide them. There are regions of Scotland where a doctor has often to be thirty or forty miles away from the place where it is essential for him to attend in two or three hours. The geographical dfficulty is, in many instances, very great. There are islands of two hundred, or three hundred, or four hundred people, where the nearest doctor lives across a difficult sound and where the storms are frequent and dangerous. There are places where a single doctor has to attend the sick among six thousand or seven thousand people. There are thinly occupied glens that never see a a doctor for weeks or months. The distance operates adversely in more ways than one. Doctors have to live by their profession; they cannot spend a day in going or coming to a place unless the fee earned has some reasonable proportion to the time spent. But his outlays are often far beyond the means of his patients. In the report of the Dewar Committee on the Highlands and Islands, the geographical factor is shown, by many heart-rending illustrations, to be of first-class importance in the organization of medical service. That Committee made so overwhelming a case that the

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Report resulted in the creation of a special fund and a special Board to administer it. This Board is now absorbed in the Scottish Board of Health; but the special local problems of the Highlands and Islands will remain among the most difficult with which any Board can be faced. Among the most difficult of all is the provision of adequate medical and nursing service for expectant mothers and young children. Yet, if it is essential for this country that every child that is born alive should be kept alive, adequate arrangements must be made; economics and everything else will have to be levelled down or levelled up as the case may be, and, if this means a radical transformation of the medical and nursing service hitherto made possible by private commercial or philanthropic enterprise, the transformation must be made. Every woman that is likely to produce a living child ought to have whatever care and attendance her condition needs. We are long past the point when these fundamental duties can be left to the accidents of commercial supply-and demand or to philanthropic emotion. If you say that the numbers are small, that the infantile mortality is low, and that, in the unstressed and long-drawn days of island life, nature has a better chance and abnormalities are few, I do not here argue the points; I ask you only to study the series of cases presented by Dr. Miller of Fort William in his contribution to the Carnegie Report on Scottish Mothers and Children. If, after thinking over the hideous miseries common in the remote and thinly peopled areas, you do not feel the necessity for the better organization of medical and nursing teams, it will be from failure of imagination, not from want of poignancy in the facts. It is frequently said that, in the Highlands and Islands, the people are "fatalists," and when danger comes and death threatens the mother or overtakes the child, they are content to see in it only the hand of God, not the inefficiency of social service. To those that know rural Scotland, the allegations about "fatalism" are only ingenious inventions to soothe our consciences for our neglect or ingenious masks for the pride of people that have too little money to afford a doctor. A breath of fact kills the theory. For the moment a medical service is made available the demands on it are overwhelming. But now, even rural Scotland is awake and there is a hope that the neglects of the past will soon be ancient history. From the Islands and Highlands, many thousands of men went to the war; hundreds gave up their lives and you are not to suppose

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that the sorrow-stricken families or the returning survivors will fail to demand better things for the future.

But these are special problems needing special solutions. When we survey our great aggregates of population, we find that the deaths of children below three months are a disgrace to any civilized country. That is well known. What are we going to do? Institutions are necessary. The homes, in multitudes of instances, multiply the chances of death. If you mean to have the mother alive and well, you must make better arrangements for her confinement. But very, very soon after the birth, the child has to be fed. You must see that the woman can feed her child. Many mothers cannot, and I am sorry to have to believe that the numbers of these are increasing. The community must investigate the causes on the best lines and find what is necessary to reduce these numbers. If the numbers of mothers unfit to suckle their children are increasing, is there real necessity for the increase? Why should the mothers in the Islands and Highlands or other rural localities be able so often to do what the mothers in the industrial centres fail to do? But there the problem is: if the mother cannot feed her child on the breast, we must do our best to discover how it shall be fed and fed properly.

But the institution has its limits and its price. There is a question I should like to put here: Is a mother really necessary? Does a child require a mother after its birth? Sometimes, in conferences like these, one begins to feel that all that is asked for is that the child should be born and then handed somewhere to be brought up. This idea is imperfect. It misses an essential point; the baby needs to be nursed by someone. It needs the warmth of another human body. It needs the love of some human person. It needs to be pushed about, to be handled and dandled and caressed and fondled. To be put to lie in a crib, however nice and however clean, is not nursing a baby. I do not care how perfect an institution is, there is no institution where the children are kept by the score that is as good as even a pretty bad mother. Most people that consider the facts will say I am right. Let it be taken as true that the child needs human love. I believe that a child grows and flourishes better on love than on anything else. No doubt, it needs something along with it, but it certainly needs love. You cannot get that where there are scores together. We *must* make some arrangements for keeping the mother and child together.

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I am not caring whether she is married or unmarried. If the nation is going to have the babies alive, then the first thing to do is to keep the mother and the infant alive together. At present, you need institutions for keeping the child alive apart from the mother. But count against this the amount it takes to keep those institutions going—the service, the food and the anxiety and, at the best, it is a very poor life for the child after all. We must set ourselves to get back to the real problem and that is how the mother and child are to be kept together.

In order to maintain the health of the young child until it reaches school age, the institutions provided must be adapted to the economic condition of the home. If the mother must earn the whole or a part of the income, she must leave her house for a great part of the day and somebody or some institution must look after the children not at school. The condition of many of these little toddlers is often lamentable, and to meet their case, such institutions as day nurseries, nursery schools, toddlers' playgrounds should be organized, and medical attention and supervision given to all children attending them. The home often needs the services thus provided and, if it be said that the home should be such as not to need them, I agree; but in that case you must first arrange to provide such an income for the mother as will enable her either to stay at home and look after her children or to obtain for them otherwise the assistance she requires. The toddlers' playground is, as we have demonstrated in Edinburgh, one of the most fruitful suggestions in the healthy upbringing of pre-school children. The daily, organized play in the open, the stimulus of the cool air, the process of preparation for it, the transference to it, the two or three hours' occupation in it and the transference home, all result in generalized improvement of nutrition and a toning up of the whole tissues. Such healthy daily exercise of the very young stimulates and fortifies against disease. If anyone doubts this, let him first look at the unexercised and unbreathed toddler in his narrow home and then look on him again after six months' social experience in the expanse of the toddlers' playground. The great danger at the toddler stage is infectious diseases. Measles, whooping-cough, scarlet fever, diphtheria are all most deadly to the young child, and until the community has made up its mind that these scourges shall be as infrequent visitors as typhus, smallpox, aud typhoid, we cannot look for great diminution in the death-rate of the young.

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Assuredly, it will mean great outlay in hospitals, convalescent homes and nurses; but if the young population is to be protected from death and damage, then the country must face the expenditure. We cannot, as a nation, go on lamenting the excessive death-rates of infants and children and suggesting all manner of voluntary palliatives, so long as the public health authorities have not brought into operation their full statutory powers. It is not for want of powers that we are allowing thousands of children to die and thousands of others to be maimed for life.

If we are clear in our minds that the continuity of a nation's life demands a strong and healthy people, then we must mobilize all our resources; well-trained medical men and women, well-trained midwives and nurses, capable mothers in good homes. There are no true substitutes for mothers; but we must continue to do the best we can to make up for maternal failure. The institutions are doing much and they will do much more. But a fair-to-middling mother as a nurse is better than the most approved bottle and the most beautiful bassinette.

THE ROYAL INSTITUTE OF PUBLIC HEALTH.

The following have been elected:—

Fellows: William Anderson, M.B., John H. Chambers, L.S.A., William H. Coates, M.B., William B. Cockill, M.D., D.P.H., Francis G. Collins, M.R.C.S., D.P.H., Charles W. Conry, L.R.C.S., Henry S. Cooper, L.R.C.S., Capt. Elliott C. A. Crawford, M.D., C.A.M.C., Jerome J. Crowley, L.R.C.P., Ignatius B. Culhane, L.R.C.S., D.P.H., Bernard T. Cullen, M.B., John M. Dawson, M.D., D.P.H., Charles Dolan, L.R.C.P., William A. Doley, M.D., D.P.H., Harry Drinkwater, M.D., William Duff, M.B., Alexander F. A. Fairweather, M.B., Herbert G. Feltham, M.B., Surg.-Lieut. Ernest St. G. S. Goodwin, M.B., R.N., George E. J. Greene, L.R.C.S., Capt. George B. Harland, M.D., D.P.H., I.M.S., Thomas Harper, M.B., D.P.H., Thomas D. Harries, F.R.C.S., William W. Hellyer, M.R.C.S., James J. Hopkins, M.R.C.P., Major Robert W. H. Jackson, M.D., R.A.M.C., Samuel J. Killen, M.D., D.P.H., Lieut. Walter N. Leak, M.R.C.S., R.A.M.C., William J. Lewis, L.R.C.P., Edmund W. Lynch, M.R.C.P., D.P.H., Norman Macfadyen, M.B., D.P.H., John Macintyre, M.B., D.P.H., Joseph F. Mannix, F.R.C.S., William McAlister, M.D., Thomas McGeoch, M.D., D.P.H., Michael McGrath, F.R.C.S., D.P.H., Charles B. Meller, M.R.C.S., Albert V. Moreton, L.S.A., Edwin Norton, M.D., D.P.H., Bartholomew O'Beirne, M.D., D.P.H., John O'Callaghan, F.R.C.S., Charles H. Phillips, M.D., Edward A. B. Poole, M.D., D.P.H, John Pratt, L.R.C.P., Maurice Quinlan, L.R.C.P., Joseph Roantree, M.B., Alfred Robinson, Capt. Mortimer M. Russell, M.B., R.A.M.C., Capt. Ernest A. A. Saunders, M.R.C.S., R.A.M.C., Thomas P. Stewart, M.D., D.P.H., George F. Sydenham, M.R.C.S., Thomas M. Tate, M.D., Evan C. Thomas, M.D., D.P.H., Rowland L. Thomas, L.S.A., D.P.H., Timothy J. Vaughan, L.R.C.P., Hugh T. Warnock, F.R.C.S., John M. Waters, M.R.C.S., William C. Whitworth, M.R.C.S., Capt. Arthur B. Whytock, M.D., C.A.M.C.

Members: Ragbir S. Dugal, L.M.P., Robert R. Kidd, Harold F. Slipper.

Associates: Miss Beatrice Legge, T. M. Nair.

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HOUSING IN RELATION TO NATIONAL HEALTH FROM THE CITIZEN'S ASPECT.[1]

BY

ALDERMAN NEVILLE CHAMBERLAIN, M.P.

Late Lord Mayor of Birmingham.

IF slum areas were removed it would do away with the areas which had the largest birth-rate. Of course that was counteracted by the fact that they had a lower mortality, especially infantile mortality, and if the result of improving the surrounding was that fewer children came into the world, and that those who did so had a chance of surviving under good conditions, these advantages would outweigh the disadvantages of the lower birth-rate. The discussions upon housing have revolved almost invariably about the erection of garden suburbs, but I am afraid that the expectations which have been aroused are not likely to be fulfilled for three reasons. In the first place there was a great shortage of houses, and it would take years to overcome it. Until they had got over that difficulty it would be useless to talk about sweeping away slums, because if the people were turned out they would simply be turned into the street, as there was no place for them to go to. In the second place, there was a very large number of people who did not want to leave the locality of the slums. They did not want to go into the country, although they were not satisfied with their slums. What they wanted was improvements on the spot, and not to be forced into the country, where the surroundings would be uncongenial, and would cause them to pay tram fares to get to and from their work. In the third place, there was a number of people who did not want to pay the rent which would be charged for the new houses. They could not afford to pay the economic amounts which would have to be charged for these houses, and we must face the fact that we should have to have the slums with us for twenty or twenty-five years.

I am convinced from what I have seen of slums in the large cities, that it is possible to effect enormous improvements in the

[1] Abstract of a paper read at the Conference on "Housing in Relation to National Health," at the Guildhall, London, June 27, 1919.

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conditions of life in such places at a cost which, compared with the cost of new houses, would be comparatively trivial. I suggest that repairs and cleansing and partial reconstruction could be done, with here and there demolition of the houses in order to give more air space, and all that would make a difference to some of those unfortunate people who had to dwell in the slums. I do not believe it would be done if things were left to the private owner. I come to the conclusion that they would have to substitute the Local Authority for the private owner, and suggest that under the Housing Act, 1890, and under the new Act, local authorities should have power by compulsion to purchase unhealthy areas, and that they should also have power to purchase by agreement the leasehold interests. The local authority could then proceed with plans of reconstruction, and at the same time make plans for garden suburbs; if that were done, it would do something to redeem the promises which had been held out, and which brought a ray of hope to the people who had been too long neglected in the slums.

I beg to move a resolution that, while every effort should be made to provide the maximum number of houses on suburban sites, the local authorities should be given further powers to enable them simultaneously to improve housing conditions in the central areas in large towns. In doing so, I may say I have always advocated migration from the slums into garden cities, but I cannot shut my eyes to the fact that we could not carry out these schemes in a year or two, and that in the meantime the people who are in the slums should have something done for them.

THE ROYAL INSTITUTE OF PUBLIC HEALTH.

Annual Congress in Brussels.

At the invitation of the Burgomaster of Brussels (Monsieur Adolphe Max), the Annual Congress of the Institute will be held in the City of Brussels from May 20-24, 1920, inclusive.

The Congress will be conducted under the following sections: (1) State Medicine; (2) Naval, Military and Colonial; (3) Municipal Hygiene; (4) Industrial Hygiene; (5) Women's Work in Relation to Health; (6) Bacteriology and Chemistry. The Honorary Secretaries are Prof. Slosse, Secretary of the Faculty of Medicine of Brussels University, and Prof. Rene Saul, Secretary of the Academical Council, attached to the Faculty of Medicine.

The Congress will hold its meetings in the various Institutes in the Leopold Park, which have been placed at the disposal of the Congress by the University of Brussels.

The travelling arrangements have been placed in the hands of Messrs. Thos. Cook and Son.

Further particulars may be had on application to the Honorary Secretaries, 37, Russell Square, London, W.C. 1.

E. W. Hope, M.D., D.Sc.
T. N. Kelynack, M.D., M.R.C.P.

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SUGGESTED OVER-SEAS COMMUNITY HEALTH SETTLEMENTS FOR BRITISH EX-SERVICE MEN.

BY
E. S. SCAMMELL, F.R.G.S.

In view of the large number of our ex-Service men (estimated at 50,000 already) suffering from some form of tubercular disease or incipient lung trouble, to many of whom settlement in a warmer and drier climate than ours might, under suitable conditions, offer the best chance of early recovery, is it not desirable, and if so, possible, for arrangements to be made by the Home and Dominion Governments for the migration of such men from the United Kingdom to selected localities over-seas within the Empire? Such suggested settlements might be in the form of committees, under the control of the Over-seas Authorities, with a resident naval or military officer, in each community, appointed by the Home Government, who would assist the medical and other authorities appointed by the Governments of the Provinces or States in which communities may be located, in the care of the men and in the establishment of the Settlements.

The conditions of each Community Settlement would involve a measure of segregation and discipline, in the interests of the men themselves and the Province or State in which it is located, and the occupation of the men in some useful and attractive open-air employment, particularly agriculture in its various forms, under the direction of skilled Colonial experts.

The time during which the men would remain in the Settlement would be determined by their health condition. Until this had been satisfactorily established they would be required to stay in the Settlement, subject, in all respects, to all its rules, failing which they would be liable to immediate deportation. When, in the judgment of the medical authorities, the men are considered fit to re-enter civil life, arrangements should be made by the Government of the Province or State in which the community is located for their settlement in that Province or State, possibly under some further grouping arrangement, or for their return to the Mother Country. In the former event, immediate arrangements should be made by the Home Government, with the concurrence of the Over-Seas Provincial or State Governments, to meet the wishes of the men in regard to the transportation of their families or dependants from the United Kingdom to the Province or State

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in which they are to make their home. In the case of those who desire to return to the Mother Country, arrangements for their so doing should also be made by the Home Government. As, through the adoption of the proposed scheme, the interests of British ex-Service men would be served by their prospective earlier return to health and vigour, and the cost of their continued maintenance by the British Government would be proportionately lessened, the costs of transportation and of the establishment and working of the Settlement within prescribed limits should be borne by the British Government.

Note.—The Dominion—Provincial or State—Governments should select the location of the proposed Settlements, in conference with the British medical authorities, and may be asked to provide the land.

THE MINISTRY OF HEALTH.

Organization of Medical Staff.

We have received the following communication from the Secretary of the Ministry of Health :—

(1) On the establishment of the Ministry of Health, the medical staffs of the Local Government Board and of the National Health Insurance Commission have been brought together to form the main portion of the Medical Staff of the Ministry, but on a newly organized system, and with considerable additional posts.

(2) The Minister has appointed Sir George Newman, K.C.B., M.D., F.R.C.P., as Chief Medical Officer of the Ministry, with status corresponding to that of a Secretary of the Ministry. By arrangement between the President of the Board of Education and the Minister, Sir George Newman retains his position as Chief Medical Officer of the Board of Education.

(3) Five new posts of "Senior Medical Officer" have been established, with status corresponding to that of Assistant Secretary. To these the Minister has appointed the following :—

G. S. Buchanan, C.B., M.D.
Miss Janet M. Campbell, M.D., M.S. (who will also, by arrangement with the President of the Board of Education, act as Chief Woman Medical Adviser of that Board).
F. J. H. Coutts, M.D.
A. W. J. MacFadden, C.B., M.B.
J. Smith Whitaker, M.R.C.S. (who will also act as Medical Adviser to the National Health Insurance Joint Committee).

(4) The whole of the rest of the established Medical Staff of the Ministry will be in one grade to be known as "Medical Officers." They will comprise the remainder of the existing Medical Staffs of the Local Government Board and of the Insurance Commission, with the addition of new officers still to be appointed as the additional services may require.

The following appointments have so far been made :—
Miss Irene Cecil Davy Eaton, M.B., B.S., D.P.H.
Major Greenwood, M.R.C.S. (Medical Statistics).
Miss Florence Barrie Lambert, M.D., D.P.H. (Remedial Treatment).
Miss Jane Holland Turnbull, M.D., C.B.E. (Obstetrics and Gynæcology).

(5) Besides this regular staff, arrangements have been made whereby the Ministry may secure the services, from time to time, of specialists and others on a part-time basis; amongst these are included at present the following :—
Maurice Craig, M.D., F.R.C.P. (Psychological Medicine).
Colonel L. W. Harrison, D.S.O., M.B. (Venereal Diseases).
Sir David Semple, M.D., D.Sc. (Rabies).

Further appointments will be announced as they are made.

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THE ROYAL INSTITUTE OF PUBLIC HEALTH.

ARRANGEMENTS have been made for the following courses of lectures on tuberculosis:—

LECTURE I. October 9.

"The Early Diagnosis of Tuberculosis," by Halliday Sutherland, M.D., Ch.B.

LECTURE II. October 16.

"Predisposing Causes of Pulmonary Tuberculosis," by L. S. T. Burrell, M.A., M.D., M.R.C.P.

LECTURE III. October 23.

"The Selection of Patients for Sanatorium Treatment," by Cecil Wall, M.D., F.R.C.P.

LECTURE IV. October 30.

"The Training of the Tuberculous Sufferer," by Miss Jane Walker, M.D.

LECTURE V. November 6.

"Remarks on the Value of some Laboratory Tests in the Diagnosis of Tuberculosis," by A. Conyers Inman, M.A., M.B.

LECTURE VI. November 13.

"The Pneumothorax Treatment of Pulmonary Tuberculosis," by Clive Riviere, M.D., F.R.C.P.

LECTURE VII. November 20.

"Tuberculosis Colonies and their Management," by P. C. Varrier-Jones, M.A., M.R.C.S., L.R.C.P.

LECTURE VIII. November 27.

"Sanatorium Treatment of Pulmonary Tuberculosis." by James Watt, M.A., M.D.

LECTURE IX. December 4.

"The Temperature in Pulmonary Tuberculosis," by James Watt, M.A., M.D.

LECTURE X. December 11.

"The Diagnosis and Treatment of Tuberculosis in Relation to Public Health," by H. Hyslop Thomson, M.D., D.P.H.

LECTURE XI. December 18.

"Tuberculosis of the Larynx—Treatment, especially in the Home," by J. Dundas Grant, M.D., F.R.C.S.Ed.

Bacteriological demonstrations will be given in the laboratories of the Institute, and visits will be arranged to sanatoria, tuberculosis dispensaries, &c.

The Lectures will be delivered in the Lecture Room of the Institute on Thursdays at 5 p.m.

An optional examination will be held at the close of the course, at which certificates will be awarded to successful candidates.

Fee for the Course: Two guineas. Fellows and Members admitted free.

ON HOUSING PROBLEMS AND ALLIED QUESTIONS RELATING TO PUBLIC HEALTH.

October 29.—"General Principles of Housing in Relation to Health," by Prof. E. W. Hope, O.B.E., M.D., D.Sc.

November 5.—"Housing Problems in Rural Districts," by W. G. Savage, M.D., D.P.H.

November 12.—"Town Planning and Public Health," by Prof. Abercrombie, M.A., F.R.I.B.A.

November 19.—To be announced.

November 26.—"Housing in Relation to Tuberculosis and other Infective Diseases," by Nathan Raw, C.M.G., M.D., M.P.

December 3.—To be announced.

December 10.—"Housing in Relation to Maternity and Child Welfare," by S. G. Moore, M.D., D.P.H.

37, *Russell Square, W.C.* 1.
Telephone: Museum 766.

E. W. HOPE, M.D., D.Sc.,
T. N. KELYNACK, M.D., M.R.C.P.,
Hon. Secretaries.

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Bacteriological Notes.

BY

ARTHUR COMPTON, M.B., D.Sc.

Demonstrator of Bacteriology in The Royal Institute of Public Health.

THE INFLUENCE OF VITAMINES ON THE GROWTH OF BACILLUS INFLUENZÆ (H. Agulhon and E. Legroux, *Comptes rendus*, vol. clxvii, p. 597).—According to the authors the favourable influence of natural fluids (serum, ascitic fluid, blood) upon growth is due not so much to their content in proteins as in vitamines. For the extraction of the vitamines of blood A. and L. recommend mixing defibrinated blood with four volumes of physiological saline and heating in the water-bath at 80° C. for fifteen minutes with frequent shaking. The mixture is then filtered across paper, or centrifuged, to remove solid matter, and finally sterilized by filtration through a Chamberlain bougie F. A light brown, slightly opalescent fluid is thus obtained, which contains the necessary vitamines. The sterile filtrate is added in proportions of from 5 to 10 per cent. to ordinary culture media.

The essential vitamines would appear to be contained in the red blood cells, as the authors have succeeded in liberating them therefrom by the action of alcohol and heat and subsequent solution in water.

THE SEARCH FOR BACILLUS TYPHOSUS AND B. PARATYPHOSUS B IN WATER SUPPLIES (F. Dienert, A. Guillerd and A. Leguex, *Comptes rendus*, vol. clxvi, p. 84).—In this note the authors give an account of their method based on the employment of malachite-green broth for the isolation of such organisms in water supplies, the method having been employed daily for some time in the routine testing of the water supply of Paris. Several litres of the water to be tested are filtered through a collodion filter to concentrate the germs, and a suspension of the deposit on the surface of the filter is made in 50 c.c. of sterile saline. A 6 per cent. peptone water, to which has been added 3 c.c. of sterile bile and 2·5 c.c. of a 0·5 per cent. solution of malachite-green, is then inoculated with the suspension, and the mixture incubated at 37° C. for twenty-four to forty-eight hours. Five tubes, each containing 25 c.c. of nutrient agar to which 0·5 c.c. of a 10 per cent. solution of subacetate of lead has been added for every 10 c.c. of agar, are melted in a water-bath at 46° C. and each inoculated in succession, without recharging the needle, with a loopful of the malachite-green broth culture. The tubes, after shaking to distribute the microbes, are poured on Petri plates. When the latter have set, to each is added the contents of a tube of 40 c.c. of ordinary nutrient agar at 46° C. with the object of permitting anaerobic culture of bacilli in the lead agar. When set anew, the plates are incubated at 37° C. and the

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development of colonies followed. *B. typhosus* and *B. paratyphosus* B grow as brown colonies surrounded by a pale halo, whilst *B. coli* grows as a colony hardly at all brown and without halo. *B. pyocyaneus* also develops as colonies having the same appearance at *B. paratyphosus* B. The brown colonies with haloes are isolated and differentiated by sub-culturing in peptone water (indol and agglutination), on an agar slope (Gram staining), on neutral-red glucose agar, on litmus lactose agar, and in litmus milk.

The authors assert that their method permits *B. typhosus* and *B. paratyphosus* B to be determined with certainty in 50 c.c. of Seine river water taken at Paris. If, instead of lead agar, litmus lactose agar is employed, the results are not so good, in the proportion of 347 colonies having to be isolated from the latter medium, as against 64 colonies from the former, in order to demonstrate the presence of 10 typhoid or paratyphoid bacilli.

Action of Urine on the Treponema of Syphilis (Pierre-Paul Levy and Guilé, *Compt. rend. Soc. de Biol.*, lxxxii, 1919, p. 65).—The spirochete ictero-hæmorrhagique being fairly rapidly destroyed in the urine, the authors set out to determine if the same were true of the treponema of syphilis. They added, to 8 c.c. of urine contained in a centrifuge tube, a few drops of the serosity from a syphilitic chancre. Examination of the deposit from centrifugation, after three to twenty hours of contact, showed the treponema to be very resistant. The interest of the finding is in its practical bearing: the necessity of adding formol to such urine as soon as passed.

On the Active Constitutents of the Alcoholic Extracts of Organs as Antigens in the Wassermann Reaction (F. Lilberstein, *Biochem. Zeitsch*, vol. lxxxviii, pp. 1-13).—Livers of dogs, both fresh and after being submitted either to simple autolysis or to hydrolysis by pepsin, trypsin and lipase, were extracted with alcohol. The alcoholic extracts thus obtained were then fractionated as follows: (1) substances soluble in alcohol, insoluble in ether (soaps); (2) substances soluble in alcohol, ether and acetone (fatty acids, neutral fats, cholesterins); (3) substances soluble in alcohol and ether, insoluble in acetone (lipoids). Comparison of the above different preparations gave the following results: Generally speaking organs partially, but not completely autolysed, give extracts which yield better antigens than fresh organs. Fractions (1) and (2) yield antigens of only moderate quantity. Fraction (3) of fresh organs makes a better antigen than the total extract, although this does not hold for organs which have been autolysed. The rôle of autolysis would appear to be that of liberating the different essential substances for an antigen in the most suitable proportions. Organs acted upon by trypsin, or steapsin, lose the property of furnishing active antigens; by lipase of of ricin, or pepsin, the antigens are not affected.

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Reviews.

The Story of English Public Health. By Sir Malcolm Morris, K.C.V.O. Pp. 166. Price 5s. *Food and the Public Health.* By William G. Savage, M.D., D.P.H. Pp. 155. Price 5s. *Housing and the Public Health.* By John Robertson, C.M.G., M.D., B.Sc. Pp. 159. Price 5s. *Infant and Young Child Welfare.* By Harold Scurfield, M.D., D.P.H. Pp. 165. Price 5s. *The Welfare of the Expectant Mother.* By Mary Scharlieb, M.D., M.S. Pp. 151. Price 5s. London, 1919: Cassell and Co.

These books are the first of The English Public Health Series under the editorship of Sir Malcolm Morris, and both him and the publishers are to be congratulated upon the opportune appearance of this series which deals with public health problems which are occupying such general interest at the present time. *The Story of English Public Health* has been ably written by Sir Malcolm Morris, and he gives a graphic outline of the Public Health Service of England and Wales, from the beginning down to the creation of a Ministry of Health. Brief accounts are incidentally given of some of the great sanitatarians and administrators by whom the system has been built up.

Of all questions, there is none of such universal interest as food. In his *Food and the Public Health*, Dr. Savage gives much information on the relation between food and the health and well-being of the community. Many readers will be astonished to learn how easily and in how many different ways food can become infected with disease-producing germs, and how little has yet been done by the State to ensure to the public pure food and milk. The illustrations provide striking object lessons of the contamination to which they are liable, and the revelations the author makes will strengthen the demand for more stringent legislation.

There can be little doubt that the most urgent Public Health question of the day is the housing question, which is fully discussed by Dr. Robertson in his work on *Housing and the Public Health* and who is a recognized authority on this subject. The author regards bad housing as responsible for more ill-health than any other social condition. He shows how great is the need for more houses, and deals in a thoroughly practical spirit with the many questions of sanitation, convenience and comfort, that arise in connection with housing. The opinions expressed are valuable as they are the result of the author's own experience as the medical officer of health of one of our most crowded cities.

The problem of Child Welfare is one of the highest importance and upon its solution depends the future of the British Commonwealth. The aim of Dr. Scurfield in writing his book on *Infant and Young Child Welfare* has been to give a bird's-eye view of the whole problem of Child Welfare. One of the most interesting parts of his work is that in which he shows that among the Jews and Italians in this country, and also among the Irish, both in Ireland and in this country, the rate of infant mortality is low, because the mothers feed their babies at the breast, instead of resorting to bottle feeding. The author describes what can be done by good housing, child pensions, an efficient medical service and other administrative measures. The greatest need of all, and upon which Dr. Scurfield rightly insists, is to raise the ideals of motherhood, and he appeals to the Churches, teachers and the medical profession to take their share in this co-operative effort.

It has taken man a long time to understand how much the health of the nation depends upon the welfare of the mother during the months that precede the birth of her child. Dr. Mary Scharlieb has now compiled an excellent book on *The Welfare of the Expectant Mother*, and suggests the measures that should be taken to guard her against the dangers that may beset her. Although the author has intended her work mainly for those who look at questions of hygiene from the public health standpoint, it will nevertheless appeal to all mothers, both actual and potential. Amongst the many interesting topics, the important bearing of venereal affections upon motherhood and infancy is frankly

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discussed, since Dr. Scharleib believes that exposure of social evils is a necessary condition of their suppression. A chapter of poignant interest is that which deals with the problem of illegitimacy; it indicates the ways in which the unmarried mother can be helped to bear her burden, and how the unwanted child can be cared for and protected.

The present Public Health Series deals with public health questions of particular interest at the present time, and the books, whilst authoritative, are written clearly and in an attractive manner. They will be of much help and service to members of local authorities, district and other nurses, school teachers, health visitors, &c., and though they are intended for lay readers, medical men will do well to read them.

The Seriousness of Venereal Disease. By S. Carleton, M.D., F.A.C.S. New York, 1919: Paul B. Hoeber. Pp. 67. Price $0.75.

This little book consists of twenty-six excellent illustrations showing the ravages caused by gonorrhœa and syphilis. Opposite each is a brief description and case history. It is a reprint of a limited edition arranged by the author, and presented for the use of Base Hospital No. 48, with a view to diffusing education in prophylaxis. Throughout the writer urges the necessity of patients getting proper medical treatment at once; he rightly states that venereal diseases are largelv preventable and there is no reason that they cannot be overcome, with the co-operation of the public. To the uninitiated these photographs will bring home the seriousness of venereal diseases.

A Text-book of Chemistry. By Professor S. P. Sadtler, Ph.D., LL.D., Professor V. Coblentz, Ph.D., and Professor J. Hostmann, Ph.G. Philadelphia and London, 1918: J. B. Lippincott and Co. Fifth Edition. Pp. 765. Price 21s.

The object of the authors has been to compile a text-book on Chemistry which combines scientific accuracy and completeness with particular reference to the requirements of medical and pharmaceutical students. All the compounds mentioned in the United States Pharmacopœia are dealt with. Opportunity has been taken to thoroughly revise the present edition. The sections on inorganic chemistry have been practically rewritten and much new material embodied, whilst out-of-date matter has been discarded. The section on elementary physics has also been largely rewritten, and the organic chemistry sections have been brought up to date by the introduction of new material. There are in addition useful chapters on electrolysis and its new applications—acoustics, heat, light, magnetism. The authors have had many years' experience as teachers in Chemistry, and they are convinced that the subject must be taught not merely scientifically but also adapted to the ultimate uses of students. This is an excellent text-book for pharmaceutical and medical students. Moreover, it is sufficiently complete to constitute a valuable addition to reference libraries for graduates and others desirous of consulting a reliable and up-to-date text-book on chemistry and chemical products.

Surgery at a Casualty Clearing Station. By Cuthbert Wallace, C.M.G., F.R.C.S., and John Fraser, M.C., F.R.C.S. London, 1918: A. and C. Black. Pp. 320. Price 10s. 6d.

This volume has been written by the authors who have had much experience gained from several years' service in a Casualty Clearing Station on the Western Front. It gives in a concise and collected form the various procedures which have proved their value in the treatment of war wounds. It embodies the observations and methods of a large number of army surgeons. Much useful information is given, covering a wide ground, such as general treatment, antiseptics, wounds of joints, abdomen, chest, head, spine, injuries to the eyes, &c. A chapter on gas gangrene is included. The book is copiously illustrated with over sixty illustrations made mainly from sketches on the spot. The text matter is composed of almost new material and much that is given is not usually found in surgical text-books. This is a valuable book to all interested in war surgery, whether the surgeon is in civilian or military service.

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Volume XXVII. NOVEMBER, 1919. No. 11.

GENERAL PRINCIPLES OF HOUSING AND TOWN PLANNING IN RELATION TO HEALTH.

BY

PROFESSOR E. W. HOPE, O.B.E., M.D., D.Sc.

Medical Officer of Health for the City and Port of Liverpool.

A Lecture delivered at the Royal Institute of Public Health.

THE present position in regard to Housing is not to be regarded wholly as a legacy of the war. The war, no doubt, is answerable for a cessation of the building of new houses and to that extent is largely responsible for the shortage of dwellings required by those who are able and desire to pay the usual economic rent value for the houses they occupy. In addition to that aspect of the housing needs, there is in all towns with which I am familiar, and in all rural districts too for that matter, a very large proportion of dwellings long since recognized as unfit for human habitation; most of them are already condemned as such, all of them ought to have been. Unhappily, in the pre-war period, the processes stopped at condemnation, and the houses remain to-day with five years of added delapidation, still further degrading their condition. This cause, together with the other, are jointly responsible for the position to-day. The conversion of larger dwellings into flats has taken place, but only to a very limited extent.

However, whilst the burden has enormously increased, the outlook is more than correspondingly bright, firstly because almost every section of the public is hit, and in consequence claims will be too insistent to be set aside, and secondly, local disabilities and obstacles which stood in the way of progressive Housing Schemes for the Working Classes are struck aside and progress is made easier by this legislation.

The question is no longer one affecting merely one section of the community and that the poorer section. The object of the meeting to-day is to review as briefly as possible the position as it now stands and to interchange views as to the best methods of expediting the work. The main basic problems are more or less the same everywhere, in town or country, but differences in detail, in the best schemes for their solution, necessarily arise, and vary

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with local peculiarities. It seems, therefore, that the most useful way in which I can meet the request made to me to open the discussion, is to explain the position in Liverpool, which may be taken as fairly representative of large average mixed communities, and which certainly has laboured hard in the past, whatever achievement may have resulted, in dealing with slum areas, and whose present position is perhaps not less difficult than that of any other Centre. Liverpool to-day claims an urgent need for a minimum of 12,000 new houses, the figure being reached as follows: For many years before the war approximately 1,000 houses were built annually, and for five years that industry has wholly stopped—this represents 5,000 of the houses in the category which I first alluded to. Next there are 2,500 condemned as wholly unfit for human habitation, and all of these must be replaced. In addition, there are some 4,000 houses which, although not in a category which would justify demolition as the only remedy, yet require structural alterations of so extensive a character individually and in regard to outbuildings and relationships to one another, that the necessary work will be equivalent practically to that of providing new houses.

All of these, it will be observed, represent arrears, but if all of those arrears could be supplied to-day, there is still the current increase in population and the current increase in demand, so that three years hence, which is the time limit set for the grant of the Government subsidy, it will not be 12,000, but with the annual super-tax of at least 1,000 houses, the total deficiency will be brought up to 15,000 in this City alone before the expiration of three years if all needs are to be met; the erection of these houses within the next three years represents as nearly as can be estimated an expenditure to the taxpayer and ratepayer, as I am informed, of not less than £780,000 per annum without taking into account the annual provision for sinking fund.

Now what move has been made towards attaining the end in view? Before answering that question let me say that the burden imposed by the war and represented by the cessation of building activities, has from its very magnitude had a disturbing and perhaps retarding effect in coming to grips with it. The organization essential to avoid waste and to equalize adjustments to make equitable divisions of available material (which will be facilitated if variety is available such as concrete, timber, brick,

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stone, &c.), the difficulties of labour shortage, demands for high wages, strikes, and lock-outs, and kindred troubles which appear to follow in the wake of great wars have not tended to make things easier. On the contrary, they have led to minor friction, complaints, press correspondence and the general airing of views, some good, some bad, but perhaps on the whole not unhelpful. Reports of Advisory Councils, preparation of model schemes and specifications have all taken time, and I need not assure you, have not pleased everybody even in their result, and have pleased nobody by the unavoidable delays and restrictions which they have imposed.

Good progress, however, has been made. The Ministry of Health has approved of sites, and the lay-out and house plans of certain sections of both the Elms House, Lisburn Farm, and Larkhill estates had also been approved. Contracts had also been entered into with builders for the erection of 100 houses on the Elms House estate and 200 houses on the West Derby site, and the building of houses in the performance of these contracts were proceeding as rapidly as circumstances would permit. All materials had to be ordered through a Government Department known as the Building Materials Supply Department, and when it is considered that this department is responsible for supervising the supplies of building materials required all over the country in connection with housing schemes it is not surprising, though at times it has been somewhat harassing, that delays in carrying out the work had been unavoidable. The Housing Committee have all along been impressed with the fact that progress in the erection of new buildings would, in the circumstances, be necessarily slow, owing to the difficulties in obtaining supplies of materials, the shortage of skilled labour, and the labour disputes, which had been more or less continuous during the last few months.

The committee fully recognized the conditions under which a large number of people were, through unavoidable circumstances, forced to live. When the opportunity of a temporary expedient presented itself, as to acquire the Knotty Ash Camp, they pursued it with the utmost vigour, successfully overcoming all obstacles, and nearly the whole of the camps are, or shortly will be, in the possession of the committee. In fact, one contract for the conversion of forty-four huts into sixty-eight temporary houses has already been let and the work is proceeding rapidly, and it is only a question of days when further contracts will be entered into for

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the conversion of a further 194 huts into 260 houses, making 328 dwellings in all. The total amount of the contracts which has already been entered into, both for the erection of houses and the conversion of huts, is approximately £400,000.

Regarding the Larkhill Estate and the Fazakerley site, the Town Clerk has been instructed to obtain compulsory powers under the new Housing Act for their acquisition. When the Provisional Order authorizing such powers has been obtained, which will probably be in a month or so, the committee can almost immediately afterwards take possession. It will then be possible to obtain further tenders for the erection of an additional 600 houses or thereabouts, and the city engineer will be able to proceed with the new road which is to run from the south-east corner of the site, up through Queen's Drive to the eastern boundary of the site at the point where the bridge over the railways exists.

Regarding the work of the committee in the centre of the city, at the outbreak of the war they had in hand eight areas which had been scheduled as unhealthy areas under the Housing of the Working Classes Act, 1890, namely, Beau Street, Prince Edwin Street, Rathbone Street, Mason Street, Blenheim Street, Penrhyn Street, Saltney Street, and Dublin Street. The greater portion of these areas had already been acquired prior to the war. Negotiations for the acquisition of the remainder had been held over pending the passing of the new Housing and Town Planning Act, as it was considered advisable to take advantage of the more economical method of assessing compensation which the Act provides. The total cost of acquiring these areas was approximately £70,000, but £40,000 worth of property had already been purchased, leaving £30,000 to be spent in completing the acquisition of these sites. Under the new Act no contribution was made towards the cost of any land acquired prior to February 6, 1919. In regard to rebuilding on the areas, the pre-war cost was estimated at approximately £100,000, and as the cost of building has been so increased as to stand to-day at three times that of pre-war days, it will now be practically £300,000. Plans had already been prepared for rebuilding on some of the areas, but they had to be revised to comply with the more modern ideas of planning. However, revised plans in connection with Penrhyn Street, Blenheim Street, and Mason Street have now been prepared, and it is anticipated that a start will shortly be made with the erection of houses on those sites.

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The present position of housing in Liverpool could be shortly stated as follows: There are still about 2,500 (out of 22,000 originally scheduled some years ago) insanitary back-to-back houses to be cleared, and in addition to this a further 4,000 of another category of insanitary houses which should be demolished or reconstructed; and to cope with the shortage of houses caused through no building during the last few years — which shortage was estimated at 7,000—brought a total of approximately 14,000 houses to be provided. The number of houses which should be erected to cope with the normal increase of the population is about 1,000 per annum. The total number of dwelling-houses in Liverpool is approximately 155,000, 135,000 of which are let at rentals not exceeding £26 per annum, and of this number 113,000 are let at under 9*s*. per week.

For three years prior to 1914 no houses were built in Liverpool to let under 7s. per week, except those built by the Corporation in the centre part of the city, to re-house the dispossessed. In 1910 there were over 7,000 unoccupied houses in the city, which number had gradually been reduced partly owing to the operation of the Finance Act of 1909, causing a great reduction in the normal erection of houses by private enterprise up to the outbreak of the war. The erection of 15,000 houses in the next three years, which is the time limit set for the granting of the Government subsidy, represents a loss to the taxpayer and ratepayer of not less than £15,000 a week, of £780,000 a year, without taking into account the annual provision for sinking fund.

The lay-outs for schemes and plans for new buildings, the lay-out of the Knotty Ash Camp and the alterations made in each individual tenement, and the plans for the re-construction of insanitary property, all of which are now being followed, I have pleasure in demonstrating. Provision is made to meet every sanitary requirement; rooms are of adequate size, well-lighted and convenient. Storage room for food, &c., is provided, and each dwelling has a bath-room. Possible danger of fire is carefully guarded against. On the general question of the best material for building, it is clear that much diversity will arise, depending to a large extent upon available material in the vicinity, stone, brick and so forth; reinforced concrete hardly seems to have had an adequate trial at present. With regard to wood there can be no shadow of a doubt that if properly seasoned wood is obtainable, and

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the buildings properly constructed to start with, and taken proper care of, they will last for many years. One need only refer to the century old wood houses in Norway and elsewhere for verification of this.

It is interesting to recall that certain wooden Hospital Pavilions put up thirty years ago at Liverpool are as good to-day as they were when they were originally constructed. They have, of course, been cared for and well maintained. An important point in regard to housing questions in the suburbs of cities is that communication to and from the places of business shall be rapid and cheap.

THE ROYAL INSTITUTE OF PUBLIC HEALTH.

The following address was presented to the President of the French Republic on the occasion of his visit to London, November 11, 1919 :—

To Monsieur Raymond Poincaré, President of the Republic of France, Honorary Fellow.

MONSIEUR LE PRESIDENT,—We, the President and Council of The Royal Institute of Public Health are deeply sensible of the privilege afforded by this opportunity of associating the Royal Institute with the great welcome which so worthily is accorded to you, Monsieur le President, by the peoples of Great Britain, and so of testifying on behalf of the Fellows and Members of this Institute to the unprecedented self-sacrifice, the imperishable glory, which have irradiated the fair land of France in these latter years, and also to the high esteem and honour in which you, Monsieur le President, are personally held.

This Royal Institute, which for more than a quarter of a century has led the van of progress in this country in all matters affecting the Public Health, has thus viewed with sympathy and pride the sterling courage, the tender care, the unwearying devotion evinced by all ranks in all branches of the French Medical Services during the Great War.

Side by side on the fields of battle with those sons and daughters of France many hundreds of the Fellows and Members of this Society have had the honour of sharing in that great task of humanity. These have borne testimony to the noble sense of duty ever displayed by their colleagues.

To you, Monsieur le President, The Royal Institute of Public Health has the honour to tender with the deepest respect this wholly inadequate expression of appreciation of the high qualities of sympathy, courage and leadership by which you have guided the destinies of the people of France during those fateful years. In cordially associating itself with the popular welcome accorded to you and so to your great Republic this Royal Institute would beg that you may read into that welcome the token of a true and lasting comradeship between the French and British Peoples.

Given under the Common Seal of the Institute this twenty-sixth day of September one thousand nine hundred and nineteen.

LEVERHULME, *President.*
WILLIAM R. SMITH, M.D., D.L., J.P., Knt.,
Vice-President and Principal;
Sheriff of the City of London.
E. W. HOPE, O.B.E., M.D., D.Sc.,
Honorary Secretary.

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HOUSING PROBLEMS IN RURAL DISTRICTS.

BY

WILLIAM G. SAVAGE, M.D., D.P.H.

Medical Officer of Health for the County of Somerset; Author of "Rural Housing."

THE presence of so called slums in towns has been a long recognized evil and, at any rate, until comparatively recently, most people seemed to consider that the housing question was essentially a town problem. We are all familiar with the picturesque country cottage, and if it is a shock, it is a salutary one to realize that a large proportion of the houses in rural areas are of the poorest quality, many being unfit to live in, while overcrowding is common and widespread.

I do not propose to discuss housing problems generally, but will devote the time available to housing matters which are of special interest and importance in rural areas. The first point I wish to make is that two features have always characterized housing in rural areas; these are that the standard of quality has always been low, and that in general there has been an insufficient number of houses, with the inevitable corollary of much overcrowding. The speculative builder does not find a profitable field in the country as the wages obtained are too low, and most of the houses have only been erected to meet a specific need. There has been no inducement to erect more than was immediately required. It is true that the influx to the towns has materially diminished the village population, but this has no more than kept pace with the wearing out of existing cottages mostly erected very many years ago. In addition, in the past there was a direct inducement to diminish the number of cottages in a parish. Before the passage of the Unions Chargeability Act of 1865, the Poor Rate was levied on the *parish*, and it was therefore directly to the interest of those who paid this rate to diminish to the lowest possible the number of houses in the parish. The Poor Rate in those days was very high, and the financial inducement a strong one, and the records show that this method of reducing liability was widely practised.

To understand the rural housing problem it is essential to realize this chronic tightness of the number of houses and all it implies, a condition which is no new phenomenon, although particu-

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larly acute to-day, but which has always been the fundamental underlying basis of the unsatisfactory housing in rural England.

A number of facts directly follow. The agricultural labourer has no choice. His house may be inconvenient, dilapidated, unfit or too small, but he can only change it with great difficulty. To complain to the landlord is to run the risk of losing not only the house which he has, but his very livelihood, for to lose his house very likely means to lose his job even if the house is not a tied one. If improvements are effected he may be charged an addition to his rent quite out of proportion to the cost of the improvements effected. It is true the rent he paid was not in proportion to the value of the house, but this apparent asset was negatived by the very low wage he received. It also follows that overcrowding could not easily be remedied. Agricultural labourers usually have larger families than those of towns, and the larger the family the less the man could afford as rent. The number of two-bedroom cottages in the country is very high, and usually these fall to the lot of those with the larger families. The worst cases of overcrowding which I have encountered have been in country districts.

The agricultural labourer has therefore always been in a position of great helplessness as regards obtaining a suitable house by his own initiative. He was in need of peculiar protection and his case should have been one of special solicitude on behalf of the sanitary authorities. The Rural District Councils have, however, been particularly backward—with a few brilliant exceptions—in looking after this problem. They have had duties (specific duties) laid upon them not only to eradicate the unfit house, but to supply new houses, and until just recently, when to the spur of fresh pressure from the Central Authority has been added the inducement of nearly complete freedom from financial liability, they have evaded these duties and have not even obtained a comprehensive register of the unfit and defective houses in their areas.

The net result has been a chronic insufficiency of cottages in rural areas, and a perpetuation of houses of low quality.

To understand the magnitude of the rural housing problem it is essential to touch upon the quality and chief defects of the existing houses. The commonest defect of old cottages all over England is excessive dampness. Absence of damp-proof courses, defective or absent spouting, earth banked against the house, badly fitting doors and windows allowing rain to drive in, are all common and con-

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tributory causes. The living room floors are often very cold and damp and may be only brick or stone. Absence of through ventilation is common. It is astonishing the extent to which houses are met with in purely rural districts with this fault. They may occur as back-to-back houses but the usual type is that the backs are entirely without openings and abut upon some other property, so that no land is available for any garden at the rear of the house. Insufficient light and ventilation is very common. The ventilation of many of the bedrooms is deplorable, low windows of inadequate sizes, pockets of unventilated spaces, inadequate height of rooms are very common defects. Many cottages are without a pure and sufficient water supply. There is a great lack of houses with more than two bedrooms. The arrangements as to excreta disposal are often most unsatisfactory.

A point of great importance to the tenant and one which is not sufficiently emphasized or realized is the lack of amenities in the majority of country cottages. Baths are almost invariably absent. Cooking facilities apart from an open fireplace are often totally wanting, there are no means for washing clothes such as a copper or even a sink, closet accommodation even if sanitary is often a long way from the house and without any paved connection, while frequently it is shared between several cottages; paving round the house does not exist, there is often no larder, water has to be laboriously hauled up from a surface well and carried considerable distances. These are all highly important from the point of view of the occupier and most of them have a bearing upon health. No amount of climbing honeysuckle, clematis-covered porch, or front garden full of flowers, even with a thatched roof and diamond paned windows, will compensate the tenant for the loss of these amenities whatever the joy they bring to the urban visitor.

After the above very cursory description of some existing conditions I propose to consider some of the problems and difficulties of the subject. The housing problem must be dealt with in two stages. The present shortage of houses must be met by construction of new cottages, then the existing insanitary and defective cottages must be dealt with by destruction or alteration to bring them up to a reasonable standard of decency. The first problem which is now being tackled and which is being dealt with all over the country more or less effectively is an estimation of the needs of each parish in regard to the number of new houses required. It is undoubtedly

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a difficult matter, but with local knowledge it can be solved with fair accuracy. It involves an estimate based upon the number of houses required for the following three purposes:—

To allow for natural growth, if any is taking place; to accommodate the additional number of agricultural labourers required if more land is put under the plough; to replace houses which cannot be made fit and up to the standard of modern requirements. The usual plan is to entrust this calculation to the parish councils. While their opinion is valuable it is most necessary that it should not be taken as final, and the final number can only be assessed by an outside body, which under the present laws is the district council.

Housing needs must be considered from a wide point of view, and parishes are not water-tight compartments with the occupants only working in that parish. Also in particular the number of unfit houses and the general quality of the houses is information not known to the parish council, but is information which should be in the hands of the district council and its officers. The number of empty houses in a village is no criterion of its housing needs. We need to know their condition and why they are empty. For example, in one large parish the return made stated that no houses were required, and that there were twenty-five empty houses fit for habitation. I spent the best part of a day and inspected twenty-four of them. One was used for business purposes, sixteen were unfit and could not be made fit with any reasonable expenditure, five were poor quality houses unfit for habitation in present condition, but could be made fit at reasonable expense, and only the remaining two were fit for habitation. Yet this wholly misleading return was accepted as sufficient grounds for a decided statement that no more houses were required.

Under the new (1919) Act a special form of survey of housing needs has to be compiled by each Local Sanitary Authority and returned to the Ministry of Health by the end of October, 1919. Section II of this return consists of an estimate of housing needs, and Section IV asks for particulars of the insanitary houses, apart from those in scheduled unhealthy areas, which are dealt with in Section III.

Under the 1909 Housing Act these particulars should have been already obtained and the information should merely need abstracting from the books of the authority. As a matter of fact, however, this duty has been most imperfectly done, and I believe I

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am perfectly safe in stating that over a large part of rural England the Rural District Councils do not know the number and location of the unfit and defective houses in their area. It is a prolonged and troublesome business obtaining this information and I foresee that many of the returns under Section IV will be very incomplete, inadequate and perfunctory. The first clause of this Section raises one of the most difficult of the many housing problems. It asks, how many inhabited houses are there in the district which are not and cannot be made fit for human habitation? There is no definition anywhere in Act of Parliament or Government circular of what constitutes a house unfit for human habitation. All the Acts of Parliament are based upon an opinion. The house has to be unfit in the opinion of the Medical Officer of Health. Opinions differ and, for example, I have frequently found my opinion and that of the District Medical Officer of Health or Sanitary Inspector at variance. Many persons have demanded a statutory definition but I doubt its practicability, and in my opinion all which can be given is guiding principles. For example, a house without a pure water supply is obviously unfit. A thoroughly damp house is unfit but there are all degress of dampness and we can hardly call a house which is slightly damp unfit. In this connection it is essential to realize that the defects must be considered with each other. Often a house is unfit from the cumulative effect of a number of defects each of which by itself would be insufficient grounds for condemnation. For example, if a house has no openings at all at the back, but otherwise satisfactory, the point I lay particular stress upon is the ventilation in the bedrooms. They may be arranged so that there is ventilation across the room from the doors and windows being on opposite sides, but often enough the doors and windows are on the same side leaving large areas (always containing the beds) quite without any through ventilation. The degree of the absence of through ventilation materially influences judgment. Again as practical administrators we must have fluctuating standards as regards immediate representation of houses as unfit. It is impracticable to close a large proportion of the houses in any particular village, although it is possible to schedule the houses in groups and gradually take action.

The officers of Local Authorities need to come to a better understanding in regard to their sanitary classification of houses, while there is a considerable need for more knowledge and appreciation as to the conditions which really make a house unfit. For

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instance, it is not uncommon for sanitary inspectors to report adversely upon houses which are merely dilapidated (this, however, is a serious defect) but otherwise sanitary, while they pass houses which are kept clean and in good repair which are fundamentally unsound, having defects such as totally inadequate ventilation or unfit water supply.

What is to be done with the existing houses? Every local housing authority should divide the houses in its area into three groups:—

(*a*) Unfit for habitation and cannot be made fit with a reasonable expenditure.

(*b*) Defective but not unfit and can be made reasonably fit.

(*c*) In good condition and needing but attention to minor matters.

Group A. Should be scheduled as unfit and closed as soon as fresh houses are available. The owners should be told they are unfit and not invited to spend much money on them.

Group B. Owners to be told they will be passed and permitted to be used for habitation if the repairs and alterations in a scheduled list are all carried out. If not carried out the Local Authority would either close or carry out the work at owner's expense (Section XXVIII of 1919 Housing Act).

Group C. Owners to keep in good repair and condition as required by the Housing Acts.

All this should have been done years ago under the Housing Act, 1909, and it is important that this primary classification should be completed. It is only fair to an owner to let him know where he stands and it is most unfair, as is so commonly done, to invite or allow an owner to spend considerable sums tinkering up and improving cottages which are really Group A cottages and will have to be condemned whatever he does.

A point of considerable importance is the rents to be charged for the existing houses and for the new houses.

As regards the new houses the Government Circular on the new Act states that while it will not be possible to charge an economic rent, "Local authorities should, however, obtain as high rents as can reasonably be charged, and in fixing them should take into consideration not only the rents which are being paid in the locality for houses of a similar class, but also the fact that they are providing better houses with greater amenities than is usually the case, and by the end of seven years (by which time the cost of

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building is expected to be only two-thirds of the present cost) local authorities should obtain rents which would represent an economic return on houses built at that date."

This clause suggests that rents to be charged are to be not less than those being paid for similar houses in the locality plus an addition equal to the extra advantages paid.

This is a difficult point since, as every one who has to do with rural housing knows, the rents paid vary enormously and have little or no relationship to the value of the house accommodation provided.

Before the war rents for agricultural labourers' cottages varied from 2s. to 4s. or 5s. per week. The extra amenities and accommodation provided certainly represent at least 2s. a week rent, so that the rents should be not less than 5s. to 7s. per week.

I am strongly of opinion that they should be as high as can fairly be charged. The uneconomic rent is a necessary evil at present, but certainly is an evil and financially unsound as it is a subsidy to wages and one class of the community at the expense of the rest. The more nearly the rent is an economic one the better for the country generally. It is very difficult to find any formula as to what proportion of a rural labourer's wages can justifiably be spent on rent. There are too many variable factors such as size of family, size of garden, supplementary sources of income, etc., to reduce it to a mathematical equation.

I am rather concerned as to the rents to be charged for the existing houses. At present the restrictive Acts prevent these being increased, but when they are withdrawn a widespread increase is likely. The new Government-financed houses will not compete, as probably there will only be enough houses to go round. Wages have increased, and there will be an increased ability to pay. A rent increase seems perfectly reasonable for good quality houses, but to allow the rents of the numerous defective houses to be put up extensively because after war conditions prevent on the one hand private enterprise erecting, and on the other their elimination seems unsatisfactory and a form of profiteering. These cottages are not worth more than the pre-war rents. I should like to see existing houses graded into three classes:—

Class A: Passed as fully satisfactory—allowed to charge any rent obtainable.

Class B: In good condition, but not up to modern standard. Not legally "unfit for habitation." Could be improved by expenditure. To be allowed some definite increase of rent.

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Class C: Structurally defective, or very poor quality, and only allowed to be occupied because of existing scarcity or because suitable for old single couples, &c. No increase of rent allowed apart from any to cover cost of prescribed works.

Houses classed in a lower grade could be transferred to a higher if the work done to improve them justified the transfer, and this would act as a direct stimulus to houseowners to improve their property.

The grading should be done by the local authorities with an appeal to the County Council or Ministry of Health, preferably the former, whose decision should be final, unless a further right of appeal is allowed to the Ministry of Health over the County Council.

As the grading must of necessity take some time, all the houses except those known to be Class C should be provisionally classed as Class B, but this provisional classification not to be extended beyond two years. Obviously this would supply a powerful lever to obtain structural improvements.

The class of tenants for the new houses will have to be considered carefully. The suggestion that they should be left to the bidder of the highest rent is untenable. They are *subsidized* houses and therefore are let below their market value. The benefit of the subsidy should go in the first place to those who deserve and those who need it most. In these categories would come ex-Service men and those with large families.

The problem of the dirty tenant is a vexed and difficult one. In this country we pay far too little attention to the duality of obligations. A benefit is conferred, the recipient owes something in exchange, the latter is often forgotten. For example, we give free education but we do not enforce the obligation to send the children clean to school. The reciprocal obligation here should be that the house is to be kept in a clean condition and no wilful damage done. For the new houses the simplest plan would be for the Local Authority to reserve the right to vary the rent according as to whether the house is kept in a reasonably clean condition or not. Want of care and lack of cleanliness damages a house, and if due warnings are disregarded, the rent should be raised. We shall have to learn to put a financial value on care and cleanliness. I believe something might be done on the same lines with privately owned cottages, although more difficult to arrange. The educative effect would be very salutary and valuable.

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In connection with the question of the class of tenants, the important problem of the housing of those suffering from tuberculosis will have to be faced. Tuberculosis is largely a housing problem and the provision of satisfactory houses and the elimination of the unfit houses will, I am convinced, play a very large part in its eradication, but apart from this broad aspect of the question I think something should be done for the actual sufferers. Local Authorities should ear-mark some of their new houses for tuberculosis cases, that is, they should be given preference, while the tuberculosis authorities (County Councils and County Boroughs) should be empowered to assist them financially to get into these better quality houses, provided they carry out the necessary rules as to prevention of infection. In building the new houses it might be possible to adapt some of them, so that they would be useful for the continuance of open air treatment after return from a sanatorium.

The problems of rural housing are so numerous that it is impossible to do more than deal with some of them in a single lecture. I cannot therefore discuss such important questions as site, and powers of acquisition, type of house required, the number of bedrooms, parlour or parlourless, separate bathroom, &c.

As I visualize the problems the essential present need is for more new houses sufficient in initial number to enable the grossly unfit existing houses to be done away with as soon as the new ones are erected and with plans and proposals for more new houses as a further instalment to enable the below standard houses to be scrapped as soon as building becomes more normal. The cure for unfit houses is more houses, while the best test if a village has sufficient houses is if there is *one* fit empty house in it. This is to be combined with a thorough classification of the existing houses and a compulsory bringing up to a reasonable standard of those houses to be allowed to survive. The new houses must not be tied houses, nor must they be placed in remote places to suit the farmer but not the tenant. The country needs a larger proportion of its population in the country, and to get it there and particularly to keep it there, better wages and better houses are good, but they are only part of the problem. Village life must be made more attractive, while the fostering of local industries in villages and small towns is all interconnected. Troublesome and costly as the solution of the rural housing problem must be, I am convinced that it is well worth the while of the nation to solve it efficiently.

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THE TUBERCULOSIS PROBLEM UNDER AFTER-WAR CONDITIONS WITH REFERENCE TO CANADA.

BY

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MY experience in dealing with tuberculosis in this country has been limited to those cases of pulmonary tuberculosis occurring amongst the members of the Overseas Military Forces of Canada during the last two years. I feel, however, that this has given me the opportunity of learning some lessons which may be capable of more or less general application. One thing I have had impressed upon me is the necessity for caution in making a diagnosis. Last November I had the privilege of representing the Canadian Army Medical Corps at an Inter-Allied Conference on tuberculosis held in Paris under the auspices of the American Red Cross Society. The meeting was presided over by Major Rist of the French Army Medical Service, who has himself had very extensive experience in handling tuberculosis cases occurring in that Army during the war. I think most tuberculosis workers at the beginning of the war expected that a great deal of the disease would be brought to light amongst the troops. The French and Americans, however, were practically unanimous in stating that the excessive amount of tuberculosis which had been anticipated did not by any means develop. Major Rist in particular stated that a very high proportion of the cases which came under his observation, during the earlier part of the war especially, diagnosed as tuberculosis were found to be non-tuberculous. With these opinions I find myself in agreement judging from my comparatively limited experience in the Canadian Forces. In fact the impression which I carried away from this Tuberculosis Conference as a whole, presented, in one particular, somewhat of a contrast to that which I have received from similar pre-war discussions regarding the disease. In this, as well as those other conferences, great stress was naturally placed upon the need of careful differential diagnosis. Whereas, however, in conferences before the war, chief emphasis was laid upon the

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frequency with which cases of tuberculosis were wrongly diagnosed as various other diseases, in this war-time conference based on the experience gained from treating soldiers on active service, chief emphasis would appear to me to have been laid upon the frequency with which cases of various other diseases were wrongly diagnosed as tuberculosis.

I also had reason to realize how necessary it is to be extremely cautious in attempting to make practical application of what may have appeared to have been quite sound theoretically. Before the war, I had an idea, which I think was not unshared by many others doing tuberculosis work, that all that was required for complete success was unlimited authority in dealing with tuberculosis patients backed by unlimited financial resources. Practically these desirable conditions were found to exist as far as the Canadian Army itself was concerned. Although I am convinced that the Director-General of Medical Services, Canadians, acted most wisely in setting aside a special hospital for the purpose of handling this disease, and although I am confident that by this means much better results were obtained than would otherwise have been possible, nevertheless I must admit that these results, as regards the very necessary factor of co-operation on the part of patients, fell short of what might have been hoped for with the conditions as regards authority and financial resources existing in the Army. As far as I have been able to gather, practically all sanatorium superintendents in Canada dealing with soldier patients have had similar difficulties, which had not been experienced in dealing with civilian tuberculosis patients. Without pressing the parallel too closely between what it was possible to do under army conditions, and the before-mentioned ideal of maximum authority and financial resources in dealing with tuberculosis in general, the lesson which I have drawn from my experience in the Army is that a primary essential for co-ordinating all anti-tuberculosis measures and of reaping from them the greatest possible benefit, is education of the general public with regard to the essential facts of the disease, the means necessary for its prevention and the principles of its successful treatment. I have noted with regret that no reference is usually made to the great value and importance of the education of the layman in this regard. In doing tuberculosis work in the Eastern and Western parts of the United States and in Western Canada, I have had the opportunity of comparing the

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results to be obtained in communities which were thoroughly familiar with the facts of the disease, with those secured amongst people who were less familiar, and I feel that I cannot overemphasize the importance of this tuberculosis education.

A word or two might be of interest with regard to the type of case which we found amongst Canadian soldiers admitted to the hospital which I have had the honour to command for the last year and a half. These cases were classified in accordance with the standards established by the National Association for the Study and Prevention of Tuberculosis of the United States of America, partly because the medical officers at my hospital were naturally more familiar with this classification and partly because it was considered to be on the whole a very satisfactory one. An analysis of some 900 cases shows that on admission 28 per cent. were in the "incipient stage," 42 per cent. in the "moderately advanced," and 30 per cent. in the "far advanced," that is, 70 per cent. were not classified as "far advanced." Prognosis in tuberculosis is notoriously difficult and uncertain, but it might be of interest to indicate the conclusions with regard to prognosis which were arrived at in the consideration of 900 cases by the medical officers at my hospital, most of whom had had considerable pre-war experience in dealing with the disease; 54·4 per cent. were classified as "favourable," 32·3 per cent. were classified as "less favourable," or "doubtful," while only 13·3 per cent. were classified as "definitely unfavourable," including the "hopeless." An analysis of the ages of 1,066 patients showed, as was to be expected, that by far the greatest number, in fact 55 per cent., developed pulmonary tuberculosis in the third decade, between the ages of 21 and 30. Twenty-four per cent. of cases occurred in the fourth decade, between the ages of 31 and 40, and 6·7 per cent. after the fourth decade, between the ages of 51 and 57; 14·3 per cent. however, occurred in the second decade, between the ages of 16 and 20. I am not in a position to compare the percentage of those below the age of 20 in the Canadian Army with the percentage of those of the same age period who developed tuberculosis, but I am inclined to think that the latter will be found to exceed the former. If this is so it would suggest the possibility of drawing the tentative conclusion that army life on active service tends to develop latent tuberculosis in those under 20 more than it does in those of a greater age. I am under the impression, however, that

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it will be found eventually that though speaking generally army life did cause the development of a latent tuberculosis in many instances, perhaps on the whole the actual incidence of the disease was not increased thereby as much as might have been expected, possibly because the change from the mode of life followed before enlistment proved beneficial in many cases.

Before concluding I wish once more to take advantage of this opportunity of emphasizing my belief in the value of special education in anti-tuberculosis work. This I feel must not be confined to laymen only, but greater opportunities should be given both to medical students and medical graduates, of acquiring special skill and practice in the early diagnosis of the disease and a practical knowledge of its successful treatment in sanatoria, tuberculosis clinics and similar institutions. In my own country—Canada—and in the United States, the importance of this special branch of professional education is gradually coming to be better realized. The practical value of this fact has been brought home to me during the war when I have had the advantage of being able to command in my special hospital the services of medical officers with this special training.

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Chemical Notes.

BY
ALAN W. STEWART, D.Sc., A.I.C.
Demonstrator of Chemistry in The Royal Institute of Public Health.

The Gravimetric and Volumetric Determination of Mercury precipitated as Mercury Zinc Thiocyanate (G. S. Jamieson, *Journ. Indust. and Engin. Chem.*, vol. ii., No. 4, p. 296). The special reagent consists of 39 grm. ammonium thiocyanate and 29 grm. of zinc sulphate per litre. The precipitation of mercury zinc thiocyanate is made in neutral or acid solutions. In the latter case there should not be more than 5 per cent. of acid present; if a considerable quantity of acid has been used for solution of a substance, the excess should be neutralized with caustic soda. Cobalt, copper, bismuth and nickel should not be present as they are also partially precipitated. Twenty-five c.c. of the reagent is usually employed and the total volume equals 75 c.c. Energetic stirring with a glass rod is necessary. The precipitate of $HgZn(SCN)_4$ is allowed to stand one hour or more before filtration on a weighed Gooch crucible. It is washed four or five times with a solution containing 5 c.c. of the reagent and 450 c.c. of water. The precipitate is dried at 102-108° C. and weighed. Mercury zinc thiocyanate multiplied by 0·40258 = Hg. In the volumetric method the double thiocyanate is dissolved in acid and titrated with standard potassium iodate solution containing 39·2882 grm. per litre, 1 c.c. of this solution = 0·003 grm. Hg. or 0·004 $HgCl_2$. The precipitate is obtained as in the gravimetric process and after being washed, the filters are carefully removed and placed in 8-oz. stoppered bottles. Add a mixture of 35 c.c. conc. HCl and 10 c.c. of water plus 7 c.c. of chloroform. Potassium iodate is now run in whilst rotating the bottle; when the iodine, which is liberated during the first stage of the reaction, has disappeared from the solution, the stopper is inserted and the bottle vigorously shaken. The addition of the iodate is continued until the iodine colour has disappeared from the chloroform. If more than 60 c.c. of it are required, 10 to 15 c.c. of acid are added and the titration continued. Mercury oxide is best dissolved in 2 c.c. of 50 per cent. HNO_3, and then diluted to 40 c.c. Ammoniated mercuric chloride is best dissolved by treating with 5 c.c. of conc. HCl.

Differentiation of Cow and Buffalo Milk (C. Todd, G. Hogan and A. Azadian, "Cairo Public Health Lab. Report," pp. 1-3).—The Department of Public Health has adopted the following standards: for buffalo's milk, 8·5 per cent. solids not fat and 5 per cent. fat. For cow's milk, 8·5 per cent. solids not fat and 3 per cent. fat. The following average figures were obtained from 149 samples of Egyptian cow's milk: total solids 14·63 per cent; fat 5·44 per cent; solids not fat 9·19 per cent. As

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average figures for Egyptian goat's milk the authors found total solids 12·54 per cent.; fat 4·04 per cent.; solids not fat 8·50 per cent.

The Detection and Estimation of Cocaine, Heroin and Veronal (P. A. E. Richards, *Analyst*, 44, p. 192).—The various organs and fluids are weighed; the former should be passed twice through a mincing machine, after which aliquot parts are taken for analysis. A weighed quantity of viscera after being acidified with acetic acid is warmed with twice its volume of 95 per cent. alcohol; after standing some hours, decant and extract residue again with the solvent. The various alcoholic portions are mixed, strained through cloth, concentrated, and finally passed through a filter paper. If the filtrate is too deeply coloured, lead acetate may be used to clarify, the liquid being heated to boiling, again filtered and the lead removed by H_2S. The filtrate is concentrated to a small bulk at a low temperature and then reserved for the extraction of veronal, &c. In dealing with urine, acidify faintly with acetic acid, heat to boiling, add small portions of powdered lead acetate until precipitation is complete. After filtration and removal of the lead by H_2S, the fluid is concentrated and reserved for examination as above. Each of the concentrated solutions is extracted in a separating funnel with successive small amounts of ether. The ethereal portions are mixed, the solvent evaporated, and the residue dried, weighed and examined for sulphonal, veronal, trional, &c. The identification of the alkaloids is best done by dissolving them in 2 per cent. acetic acid, and evaporating a few drops in porcelain or glass dishes. The tests suggested are: (1) *Veronal, B.P. barbitone or diethyl-barbituric acid:* Melting point 191° C. when pure; about 186° C. is usually obtained. Minimum fatal dose for an adult is 50 grains. Veronal is usually excreted in the urine; it is readily soluble in alkaline solutions and easily extracted from an acid solution with ether. When fused with KOH, ammonia is evolved and the residue effervesces on the addition of dilute sulphuric acid. Millon's reagent gives a white gelatinous precipitate soluble in excess. A solution of veronal in dilute ammonia, when evaporated, yields long crystals with serrated edges, markedly different from sulphonal and trional. (2) *Sulphonal, Trional, Tetronal:* These are much less toxic than veronal. They are best identified by their melting points which are: for sulphonal 125° C.; trional 75° C.; tetronal 85° C. (3) *Heroin* or diacetyl-morphine: The hydrochloride is the salt most frequently employed. Fatal results are stated to have occurred from $\frac{1}{6}$ gr., and $\frac{1}{30}$ gr. has caused dangerous symptoms. Its melting point is 230° C., whereas morphine hydrocloride clears without melting. (4) *Cocaine:* The hydrochloride is usually met with in commerce, and has a melting point of 186° C. The alkaloid melts at 98° C. The benzoic ester reaction is very typical. If the alkaloid is dissolved in saturated alum solution and added to a dried film of potassium

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permanganate on a microscope slide, characteristic crystals are obtained. Cocaine gives no precipitate with potassium chromate until a few drops of conc. HCl are added. Morphine and heroin give no reaction with this reagent either in neutral or acid solution.

Sensitive Reaction for Manganese Salts (H. Caron and D. Raquet. *Ann. Chim. Anal. appliq.* No. 1, p. 174).—To 10 c.c. of the suspected solution, add 2 c.c. of saturated potassium oxalate solution, 1 c.c. of acetic acid and one drop of potassium bichromate or hydrogen peroxide. In the presence of manganese a deep reddish coloration is obtained, with as little as 0·1 to 0·5 milligram of Mn. The reaction is rendered more sensitive if an alkali hypochlorite is used as the oxidizing agent. Iron must not be present to any notable extent.

Disinfection with Formaldehyde and the practical Efficiency of some Substitutes for the Permanganate-formalin Method (M. A. Pozen and L. V. Dieter, *Journ. Indust. and Engin. Chem.*, No. 5, p. 448).—Owing to the expense of permanganate, the authors have sought to find an effective substitute for it in generating formaldehyde. The following recipes are recommended for each 1,000 cubic feet: (1) Sodium bichromate 10 oz.; formalin 1 pint; sulphuric acid 1½ fluid oz. (2) Barium peroxide (78 per. cent.) 1½ lb.; formalin 1 pint. (3) Chloride of lime 1½ lb.; formalin 1·7 pints. (4) Chloride of lime 13 oz.; formalin 1 pint. (5) Sodium chlorate 6 oz.; formalin 1 pint. (6) Lime 1½ lb.; formalin 1½ pints; sulphuric acid 2 fluid oz.; magnesium sulphate 1¾ oz. (7) Potassium permanganate ½ lb.; formalin 1 pint. It was found that the barium peroxide and chloride of lime methods were the easiest to manipulate. The lime methods were the most economical and the authors recommend either of the chloride of lime-formalin formulæ as the best practical method for routine disinfection of rooms.

Estimation of small Quantities of Lead in Foodstuffs, &c. (B. W. Warren, *Analyst*, 44, p. 199).—Ten grm. of the substance are ignited in a dish, dissolved in water containing 1 c.c. of nitric acid, filtered and washed. A slight excess of ammonia is added to the filtrate which should be colourless; the precipitated phosphates of calcium and magnesium are then well washed. Any copper present goes into solution whilst the lead is practically all in the precipitate. The latter is washed into a Nessler cylinder with water, 5 c.c. of dilute acetic acid are added, followed by sulphuretted hydrogen. The brownish colour is then matched colourimetrically by means of dilute standard lead solution.

Reaction for Aconitine (L. P. Palet, *Journ. Pharm. Chem.*, No. 19, p. 295).—The reagent is prepared by mixing 25 grm. of phosphoric acid and 1 grm. sodium molybdate. With this mixture a brilliant violet

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coloration is obtained with crystalline aconitine. The only other common alkaloid that may be mistaken for this is veratrine, which gives a violet red.

Iodine Value of Palm Kernel Oil (R. H. Ellis and E. M. Hall, *Journ. Soc. Chem. Indust.*, 38, p. 128).—The normal iodine number as ascertained by Wijs method was found to be 16 to 23, and the average value for 574 samples of refined oil was 18·1.

The Composition of Buttermilk (T. R. Hodgson, *Analyst*, 44, p. 229).—The author's practice is to caution the vendors of samples containing over 25 per cent. of added water but less than 30 per cent., and to recommend legal proceedings where the latter amount is exceeded. The amount of fat rarely exceeds 0·6 per cent. Of 312 samples analysed the fat ranged from 0·1—1·7 per cent.; over 80 per cent. of this number contained less than 0·7 per cent. The solids not fat varied from 3·71 to 8·5 per cent. Over 50 per cent. of the samples contained less than 20 per cent. added water. The author gives a table showing the average solids not fat and the corresponding amount of added water for each month of the year. These were from 6·57 to 7·1 per cent., corresponding to 22·71 and 16·47 per cent. of added water respectively.

Detection of Urobilin in Urine (Guyot, *Ann. Chem. Anal.*, 1919, No. 1). Ten c.c. of urine are shaken with 5 c.c. of 5 per cent. zinc sulphate and then after five minutes with 5 c.c. of 5 per cent. potassium carbonate. The precipitate formed carries down the biliary and blood pigments. After filtration, in the presence of urobilin, the filtrate has a characteristic green fluorescence. Most urines show a slight fluorescence which becomes partially oxidized during the test.

Estimation of Nitrates in Soil by the Phenolsulphonic Method. (H. A. Noyes, *Journ. Indust. and Engin. Chem.*, vol. xi., No. 3, p. 213).—Place 50 grm. of the soil in a wide-mouth bottle, add 200 c.c. of distilled water, stopper and shake vigorously for one minute. Allow to stand for half an hour, shake again and repeat the treatment several times. Filter and pour the filtrate back on the same filter paper until it comes through quite clear. When 50 c.c. of filtrate has passed through, pipette out 5 c.c. into a porcelain dish and evaporate to dryness. Five c.c. of standard potassium nitrate (1 c.c. = ·0001 grm. of nitrogen as nitrate) are next evaporated to dryness. When both dishes are cold add 1 c.c. of phenol-sulphonic acid and continue as usual. For field soil it is advisable to use 100 grm. of the sample and 400 c.c. of water; if the aqueous extract is coloured 5 grm. of calcium hydrate are added to a fresh portion of the sample prior to adding the water. If the soil contains less than 100 lb. of nitrate per million of soil, it is recommended to evaporate 20 c.c. of the filtrate.

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Bacteriological Notes.

BY

ARTHUR COMPTON, M.B., D.Sc.

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THE GERMICIDAL ACTION OF FREEZING TEMPERATURES UPON BACTERIA (C. H. Hilliard and Mildred A. Davis, *Jour, of Bact.*, vol. iii., 1918, pp. 423-431).—An experimental study of the factors entering into the problem of the injurious effect of low temperatures upon micro-organisms. The following main conclusions are drawn. Intermittent freezing of bacteria exerts a more effective germicidal action than continuous freezing. Reduction in the number of germs is less for milk and cream than for tap-water when freezing temperatures are applied, probably because of the physical protection offered to the bacteria by the colloidal and solid matter in suspension. The degree of cold obtained does not appear to play an important rôle in the destruction of bacteria, there being no critical temperature below zero where the germicidal effect is greatly accelerated. *Bacillus coli* is rapidly destroyed, up to 90 per cent. and more, in media frozen solid during three hours, than in the same media not solid but preserved liquid—through lowering of the freezing-point by the addition of glucose—at a temperature 10 degrees lower, during the same time. It is to crystallization, which exerts a mechanical action analogous to crushing, that seemingly is to be attributed the death of bacteria at 0° C. and below. The greatest reduction occurs promptly upon freezing and re-freezing, but is not caused so much by the sudden change in temperature as by this mechanical factor.

ON THE SURVIVAL IN WATERS OF *Bacillus coli* (Teissier and Couvreur, *C. R. Soc. Biol.*, vol. lxxxii., p. 357).—Bacteriological examination of a specimen of water collected twenty years ago and preserved since in carefully stoppered bottles in the dark, showed that the microbes commonly met with in waters had disappeared, and that, except for some fungi, *Bacillus coli* had persisted in all its vitality.

THE USE OF THE FINAL HYDROGEN ION CONCENTRATION IN DIFFERENTIATION OF *Streptococcus hæmolyticus* OF HUMAN AND BOVINE TYPES (O. T. Avery and G. E. Cullen, *Jour. Exp. Med.*, vol. xxix., pp. 215-234). Hæmolytic streptococci are found in different lesions of man; as also in the udder of the cow, in milk and in cream cheeses. The differentiation of the organism from human and bovine sources by ordinary methods (hæmolysis, action on sugars, pathological power, &c.) being long and uncertain, the measurement of the final hydrogen ion concentration of broth cultures after twenty-four hours at 37° C. was found to furnish a

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rapid and convenient method to make this differentiation. The authors have tested their method on 124 streptococci of human origin, and on 45 strains of bovine origin. The final concentration in hydrogen ions of streptococci of human origin varied between pH 5 to 5.3, while for those of bovine origin it was pH 4.3 to 4.5. Five streptococci labelled bovine, two of which were of undoubted human type and three of doubtful origin, gave a pH of 5 to 5.2. The rule being general, the diagnosis is made by a very simple colorimetric method, 5 c.c. of a 24-48 hour culture in a 1 per cent. glucose broth (the sugar in the broth not interfering), is diluted with 10 c.c. of distilled water and one drop of a 1 per cent. alcoholic solution of methyl-red added. With the culture of human streptococcus a feeble salmon coloration is obtained: with bovine streptococcus, a distinct Bordeaux red coloration. The results are the same for a content in glucose which varies from 0·5 to 1·5 per cent. In broth (without sugar) + 1 per cent. glucose, the initial hydrogen ion concentration is pH 7·6.

THE OPTIMUM HYDROGEN ION CONCENTRATION FOR THE GROWTH OF PNEUMOCOCCUS (K. G. Dernby and O. T. Avery, *Jour. Exp. Med.*, vol. xxviii., pp. 345-357).—The optimum concentration in hydrogen ions is the same for the different types of pneumococci, pH 7.8 approximately. It is a reaction a little more alkaline than that of blood. The limits on the acid and the alkaline side being 7 and 8.3 respectively, one adopts the zone pH 7.8 to 8 for broth culture media. If phosphates are employed as regulators of the reaction, their concentration should not depass M/10, and no other salt should be added.

ON THE DIFFERENT RESISTANCE TO NaCl OF *Bacillus typhosus*, *B. paratyphosus* A, *B. paratyphosus* B, AND *B. coli* (L. Negre, *Compt. rend. Soc. Biol.*, vol. lxxxii., p. 387).—A proportion of 6 per cent. of NaCl in nutritive agar hinders the growth of *B. typhosus* and *B. paratyphosus* A, but does not inconvenience that of *B. paratyphosus* B or *B. coli*. A proportion of 7 per cent. stops the growth of *B. typhosus* and of *B. paratyphosus* A, while markedly hindering that of *B. paratyphosus* B and of *B. coli*. To arrest the culture of *B. paratyphosus* B and of *B. coli* a proportion of 9 per cent. is necessary. Thus from the point of view of resistance to NaCl, as of resistance to heat, *B. paratyphosus* A is allied to *B. typhosus*, and *B. paratyphosus* B to *B. coli*, the latter group being the more resistant of the two.

A PLEOMORPHIC BACILLUS FROM PNEUMONIC LUNGS OF CALVES SIMULATING ACTINOMYCES (Th. Smith, *Jour. Exp. Med.*, vol. xxviii., pp. 333-344).—This bacillus has been isolated in pure culture from broncho-pneumonia lesions in calves. In the exudate it appears as a small bacillus arranged in little groups. In culture it is polymorph: in the condensation water of coagulated serum, the form observed is that of *Actinomyces* (Gram-negative filaments ending in swellings); on agar

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(containing a small piece of guinea-pig spleen) one observes first bacilli, later granulations, which are probably arthrospores surrounded by a sort of covering which represents a capsular substance or the remains of bacilli. Cultures are difficult to obtain, and subculture is required every few days. By injection into laboratory animals S. did not obtain any clear pathological action. This organism may be a variety of the Actinobacillus of Lignieres and Spitz; there was no culture in broth, no culture in closed tubes, and the bacillary form was met with in diseased tissues.

EXPERIMENTAL "INAPPARENT INFECTIONS." EXAMPLES DRAWN FROM THE STUDY OF TYPHUS FEVER (Ch. Nicolle and Ch. Lebailly, *Compt. rend.*, vol. clxviii, p. 800).—In the guinea-pig, experimental typhus only shows itself by an elevation of temperature, which sometimes may even be absent. Yet, in the latter case, blood withdrawn at the moment when the fever shows itself in the other animals, is found to be virulent, especially for the African monkey. Rats do not even react by an elevation of temperature to typhus infection, although their blood is virulent about the 12th day. N. and L. name these silent infections where the disease evolves, *inapparent* infections, to distinguish them from *latent* infections, where there is merely conservation of the microbe. The authors consider that these facts lend themselves to the following generalization: certain fevers of man may come to him from animals where the disease evolves silently.

A MICROBE CLOSELY RELATED TO THE PASTEURELLÆ GROUP, PATHOGENIC FOR MAN (Robert Debré, *Compt. rend. Soc. de Biol.*, lxxxii, 1919, p. 224).—This microbe was isolated on two occasions, in pure culture, from the pleural cavity of an individual attacked by a pulmonary congestion, complicated by pleurisy; it existed also in the pharynx. It occurs as a coccobacillus or diplococcus, more rarely as a streptobacillus. In the blood of inoculated animals, it takes on an oval form with well coloured extremities and clear space in the centre. It thus resembles *B. pestis* and the "pasteurellæ" group of organisms. It is non-motile, is easily coloured, being Gram-negative, and is without capsule. It grows best on ascitic agar and its colonies resemble those of the meningococcus. It also grows well on serum agar, in ascitic broth, and fairly well on coagulated serum. It produces indol, and ferments glucose, levulose, saccharose and mannite.

It is very virulent, and that in small doses, killing the guinea-pig in three to six days, the mouse in two to three days, the rabbit and the canary. At the point of inoculation, a marked hæmorrhagic infiltration occurs with caseous centre; the different organs are congested and show hæmorrhages; the microbe is abundant everywhere, even in the meninges. The guinea-pig can be infected by ingestion.

The blood of the patient agglutinates the bacillus up to 1/200, and deviates the complement in presence of this antigen.

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Debré classifies this microbe in the "Pasteurellæ" group, as the "coccobacillus of Strasbourg."

THE ACTION OF BILE ON BACILLUS DYSENTERIÆ (S. Marbais, *Compt. rend. Soc. de Biol*, vol. lxxxi, p. 1,136).—In view of the fact that bacilli have been observed to disappear from the intestine with an efflux of bile into the intestine, also that direct culture of Shiga's bacillus from blood has been known to succeed when culture in bile has failed, the author was led to study the action of bile on dysentery bacilli in general. Fourteen strains of Shiga, two of Hiss, and one of Flexner, were inoculated into tubes of ox-bile which had been sterilized previously at 120° C. After twenty-four hours at 37° C. subcultures were made in bouillon and on sloped agar. Of the fourteen Shiga cultures, only seven survived subculture, after inoculation into bile; while of the Hiss and Flexner cultures, all grew on subculture, the bile being apparently without any inhibitory effect.

FOOD PREPARATIONS MADE WITH BLOOD (A. Ganducheau, *Comptes Rendus de l'Acad. des Sciences*, 1918, p. 1058).—Under the present conditions of shortage of meat owing to the war, it would be advantageous if it were possible to utilize blood and certain organs to a greater extent for human consumption than has hitherto been the case. It is interesting to observe that scientific experiments have been made in France with this object in view. As the result of his work, the author proposes a new food prepared as follows: The blood of pigs, oxen and horses is collected under aseptic conditions at the slaughter house. It is heated to effect coagulation of the albumen and afterwards sterilized. The mass is crushed to a paste and fermented with a pure culture of brewer's yeast in presence of a little free acid and a small quantity of glucose at a temperature of 25°. The expanded paste thus obtained is very porous and is easily acted upon by the digestive juices. This food is excellent for making into sausages and for adding to flour in making meat biscuits, and gives products with a very good flavour. It must, however, always be manufactured from sterilized material and with a pure culture of yeast.

NOTE.

We have received from Messrs. Genatosan, Ltd., 12, Chenies Street, London W.C.1, a sample of their Sanatogen Chocolate, which consists of Pascall's pure chocolate containing a certain percentage of Sanatogen. The addition of the latter well-known concentrated food greatly increases the nutritive value of the chocolate. Sanatogen contains pure milk protein in combination with phosphorus, and the result of adding it to chocolate provides additional protein with fat and carbohydrates in an easily assimilable and palatable form. The combination of Sanatogen and chocolate is an ideal physiological diet; it offers high food-power in small bulk. It should be particularly valuable to children, whilst adults will find it very acceptable and sustaining.

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Reviews.

Text-Book of Chemistry. By Professor R. A. Witthaus, M.A., M.D., and R. J. Scott, M.A., M.D. London, 1919 : John Bale, Sons and Danielsson. Seventh Edition. Pp. 477. Price 20s. net.

This text-book is intended for students of medicine, pharmacy, dentistry and biology. It treats of inorganic and organic chemistry with information on toxicology. The general plan of the work remains the same as its predecessor and the present edition has been revised. The main purpose of the section on inorganic chemistry is to supply certain data which will serve as the text upon which to discuss the general principles of chemistry. The section on organic chemistry has been re-arranged in the light of modern and recent researches and the relationship of substances. During the revision the main difficulty has been to prevent the book becoming unreasonably large; with this object in view many of the sections on Physics have been omitted. The section dealing with Physiological Chemistry has disappeared, as this subject is so important that it can only be advantageously studied in special text-books. The sections on toxicology have been printed in smaller type. Equations are given and the subject matter is treated in an intelligent manner. An important error needs correction on p. 119, where it is stated that the arsenical stain produced in Marsh's Test is insoluble in sodium hypochlorite. The antimonial and arsenical stains have apparently got confused. This work is mainly intended for medical students and can be recommended for students in preparatory and scientific schools, to whom it will prove of much assistance.

Anaphylaxis and Anti-Anaphylaxis and their Experimental Foundations. By Dr. A. Besredka. English Edition by S. R. Gloyne, M.D., D.P.H. London, 1919 : William Heinemann. Pp. 143. Price 6s.

The subject of anaphylaxis is usually considered to be a dull topic, but the reader will find that it is possible to present this subject in an instructive and attractive manner. An admirable summary is contained in the preface contributed by Dr. E. Roux. The author takes the phenomena seen with white of egg serum, &c., and the guinea-pig as types, and he describes the various circumstances of sensitization, anaphylactic shock, desensitization, and discusses the theory of these different phenomena. The translator has furnished an excellent concluding chapter dealing with recent work on the subject. He has throughout endeavoured to keep the sense of the subject, rather than the literal text. The author and translator are to be commended for producing a readable account of phenomena which up till now have not been much understood.

An Introduction to the Study of Biological Chemistry. By S. B. Schryver, D.Sc. London, 1919 : T. C. and E. C. Jack. Pp. 340. Price 6s.

This work is one of the Modern Outlook Series, the aim of which is to present in readable volumes the results of the latest scholarships in all departments of human thought. In the present edition only one part of the subject has been dealt with, namely, that concerned with the structure of materials of which the bodies of living objects are composed. The aromatic derivatives are only briefly treated, whereas such subjects as carbohdrates and proteins which are of special importance to the physiologist, have been more thoroughly gone into than is usual in elementary text-books. The author also shows by what means organic chemistry may be applied to biological research. This is an excellent book for giving a useful opening to the study of biochemistry and should be read by all biological students.

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The Intensive Treatment of Syphilis and Locomotor Ataxia by Aachen Methods. By Reginald Hayes, M.R.C.S. Third Edition, London, 1919: Baillière, Tindall and Cox. Pp. 92. Price 3s. 6d.

The author endeavours to show in this third edition, that in the many forms of spirochætal infection necessitating the administration of mercury, the method of inunction, if properly applied, is followed by results better than those obtained by any other mode of giving the drug, and this without danger or pain. He emphasizes the necessity of carrying out and supervising the rubbing upon which so largely depends the success or failure of the treatment. The writer does not consider inunction of mercury in anyway as a rival to salvarsan; each has its appropriate sphere and limitations. His treatment would seem to be beneficial particularly in nervous syphilis. Inunction requires properly selected cases, skilled rubbers, and careful supervision. This book contains a useful account of the Aachen treatment and the arguments in favour of it.

The whole Duty of the Regimental Medical Officer. By Capt. P. Wood, R.A.M.C. London, 1919: Foster, Groom and Co. Pp. 78. Price 2s. 6d.

This is a handy little guide giving apparently the author's experience gained at Salonika, during the War; it contains many valuable hints and much advice to those for whom it is written. The subject is treated under three main headings, viz., (1) The duty of the Regimental Medical Officer to the State. (2) His duty to the unit to which he may be attached. (3) His duty to himself. These threefold points are amply discussed in an intelligent and suggestive manner. It is not difficult to see that the writer is a master of his subject and had full experience. This manual will prove useful to all medical officers stationed in climates similar to the Balkans.

Recent Advances in Organic Chemistry. By Alfred W. Stewart, D.Sc., London, 1918: Longmans, Green and Co. Third Edition. Pp. 350. Price 14s.

When the last edition of this book was published, it was impossible to foresee the rapid advances which have been made during recent years; consequently, in the present third edition several subjects are dealt with which were not sufficiently understood to justify mention in the previous edition. The author gives accounts of recent work on chlorophyll, rubber, the anthocyanins, arsenic compounds, and elements showing abnormal valencies. A new introductory chapter gives a résumé of the progress of organic chemistry in the twentieth century. To keep in touch with the modern trend towards the chemistry of natural products and substances of physiological interest, a new chapter has been contributed discussing certain theories, and the syntheses of vegetable and animal compounds. The author admittedly writes in a critical spirit; his work is written clearly and students of the various subjects are fortunate in having such useful résumés available for reliable reference by one who is acknowleged to be a competent judge. It is also full of suggestive ideas, and where still further researches are required is indicated. Advanced students of organic chemistry should not fail to have this book in their possession for careful study.

Essentials of Physiology.—By Prof. F. A. Bainbridge, M.D., D.Sc. F.R.S., and Prof. J.A. Menzies, M.A., M.D. Third Edition. London, 1919: Longmans, Green and Co. Pp. 484. Price 12s. 6d.

In the present edition, which is the third, opportunity has been taken to thoroughly revise and bring up to date the subject matter. The sections dealing with the constitution of the proteins and the chemical changes accompanying muscular contraction have been rewritten. The chapter on the functions of the renal tubules has also been overhauled so as to give as far as possible the various opinions held to-day on this complex problem. This book brings together in concise form the fundamental facts of physiology. It is primarily intended for medical students preparing for the physiology examinations. In order to compress so vast a subject into a small volume, the authors have excluded histological details and descriptions of chemical and experimental methods for

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which separate books are usually used for the student's laboratory course. As a work to refresh the memory on the essentials of physiology, students will find it a welcome and useful aid; it is well arranged and contains 179 good illustrations

The Cost of Food. A Study in Dietaries.—By Ellen H. Richards and John F. Norton, Ph.D. New York: John Wiley and Sons; London: Chapman and Hall. Third Edition. Pp. 148. Price 5s.

Although nine years have elapsed since the second edition of this book was published, the greater part of the text remains true in principle. While there has been an increase during this period in the price of raw food materials, there has been a still greater change in standards. The increase in four years in retail food prices in the United States was about 30 per cent. Dietaries are discussed suitable for the infant, child at school, youth at college, travellers and professional men, as well as persons in pauper institutions, hospitals, &c. Many useful tables showing food values have been included, and a special chapter on the planning of meals has been contributed. Although mainly applicable to the United States, this book contains many excellent tips upon catering and diet which householders in this country would do well to become acquainted with.

The Examination of Milk for Public Health Purposes. By Joseph Race. New York. 1918. John Wiley and Sons. London: Chapman and Hall. Pp. 224. Price 8s. 6d.

This work is primarily intended as a practical handbook for those engaged in the chemical and bacteriological examination of milk for public health purposes. A full account is given of the chemical methods of milk examination together with a discussion upon bacteria and the sources of contamination both intra- and extra- mammary. The bacteria in milk, their enumeration and identification, excremental and pathogenic organisms, are adequately treated in Chapters IV to VII. The 8th chapter contains a good account of cells, dirt and debris. In the bacteriological section the author has only described methods which have been proved to be reliable; in some cases he has given details of the standard methods adopted by the American Public Health Association. This is an excellent book for giving a clear account of what milk is and the standards of cleanliness and purity to which it should conform. At the conclusion of each chapter will be found a copious bibliography.

Indigenous Drugs of India. By J. C. Ghosh, B.Sc. Calcutta. 1918. Butterworth and Co. (India). Pp. 32. Price 1s.

This pamphlet deals with the scientific cultivation and manufacture of the indigenous drugs of India and contains certain suggestions for the development of new industries. The present pamphlet is meant to supplement the writer's two preceding ones on drug manufacture and chaulmoogra oil. The war soon brought about the stoppage of European supplies of drugs so that steps have recently been taken to cultivate belladonna, ipecacuanha and other plants in India. There is no doubt a large and promising field open to pharmaceutical manufacturers both scientific and commercial. The writer has given in the appendix the names in eight Indian languages of the vegetable drugs recognized by the British Pharmacopœia. This pamphlet shows what is needed in the domain of drugs.

Skin and Venereal Diseases. Vol. VII. *The Practical Medicine Series.* By Professor O. S. Ormsby, M.D., and J. H. Mitchell, M.D. Chicago: 1918. The Year Book Publishers. Pp. 238. Price $1.40.

The present volume is one of a series of eight, issued at about monthly intervals and covering the entire field of medicine and surgery, each volume dealing with the work done on its special subject for the year prior to its publication. A large amount of information is contained in the present work on skin and venereal diseases and it is compiled in a clear and intelligent manner. The sociological as well as the purely clinical aspect has been duly considered. The section dealing with the treatment of the disease is deserving of special

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mention and in the gonorrhœa section there is an interesting mention of phlebitis of the deep dorsal vein, a subject which hitherto has not received much attention. This Practical Medicine Series is published primarily for the general practitioner but as each volume is issued separately those interested only in special subjects are catered for. We can commend this book to syphilologists.

The Blind: Their Condition and the work being done for them in the United States. By Harry Best, Ph.D. New York and London, 1919: The Macmillan Co. Pp. 763. Price $4.

In this book the field of inquiry in respect to the blind has been limited to the United States except in so far as an account is necessary of the operations in foreign countries in the way of affording instruction to blind children and the devising of a system of raised print. Of the blind much has been written, yet praiseworthy as are the aims of these many accounts, the nature of them remains largely one of sentiment. The condition and the problems of the blind have in the main been treated as matters of human interest. Concern in the blind that is based upon their actual position in society and the treatment which they have received from it, purely as a matter of scientific inquiry, has been of secondary moment. In this work the author has given what may be described as a comprehensive social survey of the blind, and of their estate from a social and economical point of view. The blind must be regarded as certain component parts of the population of the State who demand attention in its machinery of organization. The author examines the various problems that are created by the blind, and he discusses the extent, form, adequacy and correctness of the treatment accorded to them. This is an excellent work on a vast and complicated problem, and the author has much to say that should be carefully read in this country, and should stimulate us to alleviate the lot of those who sit in darkness.

A Systematic Course of Qualitative Chemical Analysis. By Professor H. W. Schimpf, M.D. New York: John Wiley and Sons. London: Chapman and Hall. Third edition. Pp. 187. Price 7s.

The second edition of this book having been exhausted, and owing to a greatly increased demand for it, the author has now published the third edition of his popular work. The features which made the former editions attractive to students have been retained, but a careful revision has been effected and much new matter added. The scheme for the acids has been improved, and the addition of many charts has added to the utility of the book. It is mainly intended for pharmaceutical chemists, and as the time allotted to their studies of this subject is restricted, the author has condensed his material and treats only of the more characteristic chemical reactions. In commendably short space, he deals with its principal inorganic as well as organic qualitative reactions. The first part of the book explains some of the elementary principles of chemistry, notation and nomenclature, &c. The second part consists of the identification and separation of inorganic bases and acids. The concluding part deals with the qualitative analysis of organic substances, and there are many useful charts. This is an excellent work for beginners and for elementary analytical workers. They will much appreciate its lucidity and brevity.

The Early Diagnosis of Tubercle. By Clive Riviere, M.D., F.R.C.P. London, 1919: Henry Frowde, Hodder and Stoughton. Second edition. Pp. 314. Price 10s. 6d.

The author has taken the opportunity, on the publication of a second edition of his book, to considerably revise and expand it. Whole sections, more particularly those devoted to physical signs, both in adults and children, have been practically re-written; many others have been increased. New matter and fresh illustrations have been introduced which have materially enhanced the value of this work. The important but hitherto little recognized condition of hilus tuberculosis in the adult is adequately described, and being based on the writer's personal observations is particularly valuable. Notwithstanding these additions

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the present edition has only increased by just over fifty pages as compared with its predecessor. The author deals mainly with those forms of tuberculosis which are common and tend to spread the disease. He supplies the essential elements of diagnosis in the two conditions where it seems most urgently needed, namely, in early pulmonary tuberculosis of adults and in tuberculosis of thoracic glands and hilus tuberculosis in children. The early diagnosis of tubercle is difficult and tedious; the author's work is commendable for its handy proportions, and should facilitate diagnosis for the busy medical practitioner.

White and Martin's Genito-urinary Surgery and Venereal Diseases. By Professor E. Martin, M.A., M.D., Professor B. A. Thomas, M.A., M.D., and S. W. Moorhead, M.D. Eleventh edition. Philadelphia and London, 1919: J. B. Lippincott Co. Pp. 935. Price 30s.

We recently had occasion to favourably review the tenth edition of this well-known book, and the high opinion then expressed is confirmed in the eleventh edition, which has now been issued. As compared with its predecessor of 1917. it has seven pages more, and there are two extra engravings. Much useful and up-to-date information is given on recent developments, such as the tests for renal function, the laboratory diagnosis and control of treatment of syphilis, the value of serums and vaccines, &c. The work is profusely illustrated with over 400 engravings and twenty-one excellent coloured plates, and the frontispiece contains a good illustration of the inorganic sediments usually met with in urine. This book is a leading one of its kind, and we can recommend it as a reliable text-book on the treatment of genito-urinary and venereal disorders.

Catalogue of Lewis's Medical and Scientific Circulating Library. London, 1918: H. K. Lewis and Co. New edition. Pp. 492, Price 12s. 6d., to subscribers 6s.

Lewis's Medical and Scientific Circulating Library requires no introduction. as it is so widely known. The present catalogue includes a classified index of subjects and has been revised to the end of 1917. It is divided into two sections showing first the names of authors, titles of books, prices and dates, and secondly a subject-index giving the names of authors whose books are in the library. The catalogue is well got up, and owing to its simple arrangement enables quick and easy reference.

Animal Parasites and Human Disease. Professor A. C. Chandler, M.S., Ph.D. New York, 1918: John Wiley and Sons. London: Chapman and Hall. Pp. 570. Price 21s.

The aim of the author in writing this book is to give the important facts of parasitology as related to human diseases, and it is intended not so much for the specialist but rather for general readers interested in this subject. No attempt has been made to give detailed descriptions of parasites, nor are there discussions of correct scientific names and synonymy. These have wisely been omitted, and would only confuse lay readers. The text matter has been divided into three main divisions, viz., protozoa, worms, and arthropods. The first group is subdivided into eight divisions, which include the parasites of syphilis, kala-azar, sleeping sickness, amœbic dysentery, yellow fever, dengue, &c. Amongst the "worms" much useful information is given on the various flukes, tapeworms, hookworms, trichina, &c. The last division deals with the diseases conveyed by ticks, mites, lice, fleas, bugs, mosquitoes, blood-sucking flies, &c. There are over 250 excellent illustrations, which are mainly pen and ink drawings by the author. He has succeeded in providing an interesting and informative treatise on parasitology in its relation to human disease. We can cordially recommend this work to public health and immigration officers, teachers of hygiene, preventive medicine, and domestic science. This work should arouse the interest of more students in this branch of science, so that more workers may be added to the ranks of the parasitologists.

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PREDISPOSING CAUSES OF PULMONARY TUBERCULOSIS.

BY

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A Lecture delivered at The Royal Institute of Public Health.

THE great majority of town dwellers become infected with pulmonary tuberculosis during their lives. But of these only a comparatively small number die of the disease. In the majority of cases the disease is so mild that neither the patient nor his friends know anything about it, and tuberculosis is found by accident at the post-mortem. In a few cases it develops into an acute disease, fatal in a few weeks or months. In others it may last for a few years, and then prove fatal, or the patient may recover completely after treatment. Now I want to emphasize the point that most people have pulmonary tuberculosis. It has a most important bearing on many problems connected with the disease. For example, consider the matter of heredity. It has been asserted that pulmonary tuberculosis runs in families. What is meant by this? The suggestion is that certain people seem to inherit peculiarities which enable the tubercle bacilli to grow and multiply in their lungs. The meaning is not that because a man has signs of infection his family are liable to become consumptive. To be quite clear on this point let me say that if a man told me that after death from some other cause his father was found to have old tuberculous disease of the lungs, I should not consider that to be a family history of tuberculosis. If he told me that his father had died of the disease I should take a different view.

Pulmonary tuberculosis has long been considered hereditary. In the seventeenth century Sylvius wrote, "Whole families are so disposed to consumption that few of their members escape this fell disease." And yet recently we have from America reports on a thousand families where it was found that pulmonary tuberculosis was present in only ten per cent. more frequency in cases with a family history of consumption. This difference, it was stated, could be accounted for by contact. Personally, I think that heredity does play a part, not a great part perhaps, but still a distinct part in consumption. If a child of consumptive parents

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were taken away and brought up in some country place to a healthy life I do not suggest that it would be liable to contract consumption. But put that child to struggle for its existence in a large city with other children of healthy parents, and I do think it would be more liable to become consumptive than the others. We know that certain races are more liable to consumption than others. It seems to me to be very difficult to deny that certain families are more liable than others. Out of 221 cases of my own there was a family history of consumption in ninety-six, and of these in twenty cases more than one member of the family had been affected. In taking these figures I included only those who had actually died of the disease.

With regard to other diseases. Influenza is, I feel sure, a predisposing cause of consumption. Since the recent epidemics I have seen many cases of consumption which appear to have followed the influenza. It may be that the general resistance is much lowered by the influenza, so that the tubercle bacilli can grow well, but it is quite likely that many cases of so-called influenza are in reality attacks of tuberculosis, which usually heal, but occasionally develop into clinical pulmonary tuberculosis. This view is supported by the fact that after an attack of influenza one can often hear crepitations at one or both apices of the lungs. If a patient with latent tuberculosis develops another disease, or has an accident or an operation, it is quite possible for the tuberculosis to flare up into activity. With the exception of influenza, however, I do not think any one disease predisposes to tuberculosis more than another. For instance it is rare, in my experience, to find tuberculosis following pneumonia. With regard to pleurisy, tuberculosis certainly does follow very frequently, but then pleurisy is usually caused by the tubercle bacillus, so that it should be considered rather the result than the cause of consumption. In the old days hæmoptysis was thought to be a cause of consumption. Now we believe it to be the result.

And when we consider debility, it is difficult to decide to what extent, if at all, the debility predisposes to consumption. From observations I have made at the Brompton Hospital, it is not my opinion that delicate people are more liable to consumption than others. Comparing the weight and height of patients who are affected I have been struck by the fact that the majority are by no means below the normal standard. People become delicate as a

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result of tuberculosis, they do not become tuberculous because they are delicate.

Alcohol and syphilis seem to me to be of no importance as predisposing causes of consumption. It sometimes happens that a wage-earner spends so much money on drink that he has not enough left over to support his family. As a result the family live in an overcrowded house and are insufficiently fed and clothed. Consumption is very common amongst such families and for this some people blame alcohol. But the condition of the family would be the same if the wage-earner spent as much money on subscriptions to a temperance society instead of spending it on drink. No, it is not alcohol, it is poverty. Cure poverty and you will have gone a long way towards stamping out consumption. Amongst the well-to-do consumption is a rare disease, amongst the poor it is very common. In districts where less than ten per cent. of the people live more than two in a room, the death-rate from pulmonary tuberculosis was found to be from 1 to 1·1 per 1,000. As overcrowding increases, so the consumption death-rate increases, until it is found in districts with over 30 per cent. of the people living more than two in one room, to be from 2 to 2·6 per 1,000. In studying consumption statistics one always finds a constant relationship between overcrowding and consumption. Overcrowding is but an index of poverty. A man is made susceptible to consumption less perhaps by the actual overcrowding than by the dirt, the lack of good or even sufficient food, the misery and the absence of hope which goes with it. In one word, Poverty.

In the Registrar-General's report for 1916 the consumption death-rate is given as 2·24 per 1,000 living for Southwark, and only 0·736 per 1,000 living for Hampstead. That is to say about one-third. Other statistics also show well the difference between consumption in the poor and well-to-do districts in London. If then we take poverty as one of the great predisposing causes of consumption, why is the disease so much less common amongst the country poor than the town poor? I think the answer is simple; there is very little real poverty in the country in England. Wages may be small but living is cheaper. The clergy and those who work for the poor are able to do so much more in the country, where they are not faced by the enormous numbers found in towns. Some of the country cottages are atrocious but people do not live in them as much as they live indoors in towns. They are more in

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the open air. Besides there is not that constant moving as in towns where it often happens that several families have lived in the same room in the course of a year. A country cottage is often filthy, but there is not as a rule the squalor, the dreariness, or the misery of a town house. I do not think one can compare the poverty of the country with that of the town. In England and Wales 1899 to 1903, the consumption death-rate per million living was 1,270. In urban counties it was 1,380, and in rural counties it was 1,160. These figures are for both sexes and for all ages. Men are more affected by town life than are women. During these years (1899-1903), the consumption death-rate per million living was: Rural counties, men 1,260, women 1,060. Urban counties, men 1,670, women 1,110.

It is difficult to say exactly what factors arising out of poverty most assist the growth of the tubercle bacillus. It seems to me that food is a most important factor. It is well known how rapidly consumptives improve if given a good and liberal diet. Not only do they put on weight but the signs of disease also become less. It is natural, therefore, to suggest that a mean and bad diet should have the reverse effect and cause a patient in the early stages of infection to become worse. As I have already pointed out, we know from post-mortem examinations that almost all of us are infected to a small or great extent during some period of our lives. Then again the question of dosage or quantity of infection arises. It is known that a large dose of tubercle bacilli has much more effect than a small one. This has been clearly demonstrated by experiments on animals. It is obvious, therefore, that if there is infection a patient living in a small badly ventilated room has a greater chance of getting a large dose of infection than one living in large airy rooms, where the infection will be much diluted. This certainly is of great importance in the matter of poverty predisposing to consumption.

It is difficult to say whether continual wretchedness, anxiety and absence of pleasure in life predispose to consumption. Mental depression may tend to prevent a man from resisting infection.

During the war tuberculosis increased, whereas until the war it had been gradually and steadily decreasing for over half a century. This increase may have been partly due to the worry, anxiety and strain that so many people had to undergo during the war. It can hardly have been due to lack of food, for in spite of the necessity

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for ration cards during the latter part of the war, most poor people lived better during the war than they ever lived before in their lives. However, I doubt if worry can play more than a small part in the matter. Tuberculosis is only slightly more common amongst actual lunatics, if properly cared for, than others. It used to be very common in asylums, but so it was in prisons, barracks and other institutions. Now, however, with improved conditions the incidence of consumption in all institutions has been much reduced. In the mental hospitals of New York State during the twenty-eight years ending 1906, there were 28,106 deaths, and of these 4,059 were from tuberculosis. That is to say 14·4 per cent. Now in the year 1906 amongst the total population of New York State 10 per cent. of the deaths were due to tuberculosis. Not such a great difference especially if we remember how much less the consumption death-rate was in 1906 than it was twenty-eight years earlier. Another point arising out of poverty is the unavoidable exposure to cold and wet. Anyone well-to-do who gets wet (and this happens only rarely), can have a hot bath and change his clothes. The very poor have to remain in their wet clothes. I have seen many soldiers who have developed consumption, resulting, as I believe, from exposure to cold and wet during the war. This cause of consumption indeed has been officially recognized. With regard to cold alone it is largely a matter of sudden change of temperature. A poor man leaves a small stuffy room and goes out into the cold insufficiently clad. A severe cold is the least one can expect. True, one tends to become hardened by this mode of life, but at the same time I feel certain that exposure does predispose to consumption.

Another disadvantage under which the poor live is the lack of fresh air and light in their rooms. Some attempt has been made to persuade the poor to keep the windows more open, but when we picture a family living during cold weather in one room, can we wonder that the windows are shut? They have to choose between living in actual cold and living in a stuffy atmosphere, and most of them naturally choose the warmth.

Finally, overcrowding itself plays some part, though I think only an indirect one, in predisposing to consumption. If four people are living in one small room and one of them has consumption, the others are in considerable danger, because each is exposed to the risk of a large dose of infection. But it seems to

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me that the actual overcrowding, apart from the risk of infection, is not very harmful. Animals and certain races of man live and sleep close together. It seems almost natural so to do. I believe that if one man lived in a small dirty room, under other conditions of poverty, he would be almost as liable to succumb to infection as if he shared the room with others.

I have now discussed poverty as a predisposing cause of consumption. You will see that under poverty I include:—

(1) Insufficient and bad food; (2) the serious risk of exposure to a strong infection of tuberculosis; (3) unhappiness and mental depression; (4) compulsory exposure to cold and wet; (5) lack of fresh air and light; (6) overcrowding.

Each and all of these factors prevent the individual from resisting tuberculosis and the cause of them all is poverty.

Occupation in relation to consumption is important and interesting. All dusty occupations favour this disease. Thus we find stonemasons, grinders, pottery workers, file cutters, &c., are liable to contract consumption. Coal miners, however, are less prone than others, and the reason for this is doubtful. Perhaps the coal dust does not form a good soil for the tubercle bacillus. The consumption mortality amongst all occupied males between the ages of 50 and 55 in England and Wales fifteen years ago was just under 3 per 1,000 living. At the same time the consumption mortality amongst file cutters between the same ages was 7 per 1,000 living. Amongst agricultural labourers it was 1, and amongst seamen it was 3·8. This fact should be noted by those who advocate a sea voyage in cases of consumption. Tin miners are especially liable and amongst them the consumption death-rate between the ages of 50 and 55 was 16 per 1,000 living during the years 1900 to 1902. For the same ages and during the same years the consumption death-rate was:—

Lead miners	8	per	1,000	living.
Potters	7	,,	,,	
Slate and quarry men	4·5	,,	,,	
Stonemasons and bricklayers ...	4	,,	,,	
Iron miners	3·5	,,	,,	
Coal miners	2	,,	,,	
All occupied males	3	,,	,,	

Tailors are said to be very liable to become consumptive, but many of them are Russian Jews, and I think all East End

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Russian Jews are liable. Most of the Russian Jews who are not tailors are cabinet makers, and during the war I was able to see some statistics which showed that the cabinet makers were just as susceptible as the tailors. This brings me to the consideration of the effect of race upon tuberculosis. Jews as a race are particularly free from consumption. The races most seriously affected are those who have only had any tuberculosis at all recently or those who only in recent years have had the blessings of what we call civilization or kultur. In his savage state the negro did not suffer from consumption, and the disease was practically unknown amongst the negro in his condition of slavery. Now they enjoy freedom and in the U.S.A. three of them die of consumption to one of the white population. In Boston in 1900, 7·4 of the negro population and 2·25 of the white per 1,000 living died of consumption. During the same year the total consumption death-rate for the United States was 1·75 per 1,000 living for the white and 5 for the negro populations.

Similarly with the American Indians. It is estimated that 66 per cent. of the deaths amongst them are due to consumption. Indeed they are almost becoming exterminated by the disease. Yet before they came into contact with white people tuberculosis was most rare with them. The Chinese and Japanese living in the U.S.A. are also very liable to become consumptive. In 1900 the consumptive death rate per 1,000 living was: 6·58 for the Chinese; 2·39 for the Japanese; 1·75 for the white population. In their wild state monkeys do not have consumption, in captivity it is their most common and deadly disease. We may well ask: Is there some racial peculiarity or susceptibility, or is the explanation only that living creatures suddenly taken from their usual and natural mode of life and placed under new and artificial conditions are less resistant to disease? It must not be forgotten that races amongst which consumption was practically unknown a few years ago have not inherited that immunity which has probably been transmitted from generation to generation in other races. Tuberculosis in connection with the Irish throws some light on this matter. In the first place the disease has been common in Ireland for centuries, and they cannot therefore be compared to certain races who have only recently come in contact with it. Secondly, whether they live in Ireland or elsewhere the Irish are susceptible to consumption. For in the U.S.A. the Irish suffer from con-

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sumption more than any other white race. Now in Ireland itself the maximum consumptive death-rate occurs between the ages of 25 to 35 in males and was for those ages: 4·6 per 1,000 living in the decade 1881 to 1890, and 4·4 during 1901 to 1910. Compare this with England and Wales, where the maximum consumptive death-rate occurs between the ages of 45 to 55 in males and was: 3 per 1,000 living from 1881 to 1890, and 2·5 from 1901 to 1910.

For women the ages of maximum consumptive death-rate are 20 to 30 in Ireland, and 35 to 45 in England and Wales. In Ireland this death-rate was 4·3 from 1881 to 1890, and 3·6 from 1901 to 1910. In England and Wales it was 2·6 from 1881 to 1890, and 1·5 from 1901 to 1910. In England and Wales the age of greatest consumption mortality has become later during the last half century, but this has not happened in Ireland, where most deaths from this disease still occur in early adult life.

In conclusion I will repeat that consumption is with us all. Some races, some families, some individuals are more susceptible or less resistant than others, and with them the tubercle bacillus can thrive. There is no one cause to account for this lack of resistance in some. I have referred briefly to several factors which favour the growth of the tubercle bacillus in the human body. I do not hesitate to say that of all causes the greatest are those which I have described under the one heading—Poverty.

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THE WELSH SANITARY SECTION: ITS WORK ON ACTIVE SERVICE.

BY

D. LLEWELYN WILLIAMS, M.C., F.R.C.S., D.P.H.

Late Captain, R.A.M.C.

Work on Active Service (*France*).—The 38th (Welsh) Division crossed over to France in November, 1915. The troops were billeted in the back area, notorious for its lack of sanitation. Barns took the place of huts and there were no sanitary arrangements of any kind. The Sanitary Section at once commenced to organize and to suggest appropriate methods to meet the new conditions. The farms varied considerably in size, some were large enough to accommodate a company, others could only take a platoon. It was decided that a sanitary area was necessary for each group, whether it was a company or a platoon. This sanitary area was made easily accessible to all the men and notice boards indicating the position were erected. Each sanitary area consisted of latrines, urinals, an incinerator, and, where possible, an improvised ablution bench. These installations were necessarily of a temporary nature and were rather primitive owing to the lack of material. However, they served the purpose and were kept clean and inoffensive. Two men of the regimental sanitary squad were placed in charge of a company's sanitary area and one man in the case of a detached platoon. This meant a small addition to the personnel of the sanitary squads, but as the billets were so scattered, this was inevitable. The Regimental Medical Officer and the sanitary corporal supervised these sanitary arrangements and in this work they received assistance from the inspectors of the Sanitary Section. Every endeavour was also made to render the billets comfortable; it was found necessary to make them rainproof and draughtproof. The floor of the typical barn was generally covered with straw which was used as bedding by the men. Men walked on this straw with dirty and muddy boots and fouled the bedding. This unsatisfactory condition was remedied by placing retaining boards 6 ft. 6 in. from the wall all round the barn. The portion between the board and the wall was covered with clean straw and was to

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be kept strictly as a sleeping place. The central portion only was used during the day. Each man had a place allotted to him as a bed and large wire nails were fixed in the walls behind each bed for hanging his clothes, &c. Each soldier had to arrange his equipment and clothing, &c., in a uniform manner; it looked neat and tidy, and in case of a sudden call there was no confusion as each man knew exactly where to find his belongings. Further, the men soon took an interest in keeping their surroundings neat and clean. The large space between the double barns was generally used as a mess room; improvised tables and benches were constructed and the men were thus able to eat with some comfort. They were also shown how to improvise candlesticks from biscuit tins, which proved very useful and saved many a barn from being accidentally burnt. Also tins or sandbags were hung in convenient places for receiving waste paper, tins, &c., and these were collected daily and the refuse burnt in the incinerators. The important duties of organizing baths and laundries were now undertaken. Steps were immediately taken to start baths in each brigade area. A building was hired and large casks were bought in a neighbouring town, the casks were sawn in two and the resulting tubs converted into baths. The building was divided into a bathing and dressing-rooms. Water was heated by means of Soyer stoves. In other areas we were fortunate in securing accommodation at breweries and thus obtained an ample supply of hot water. In such cases it was only necessary to provide tubs and arrange the bath-room and dressing-rooms. At a later stage the tub system was abandoned and a proper heating apparatus with a system of sprays was provided. This new system was economical in fuel and water—a great consideration. The Sanitary Section erected several baths of the latter type in many districts. How to provide a change of underclothing for the men was the next problem. Improvised laundries were inaugurated and on two occasions the artisans of the Section converted old buildings into temporary laundries and drying rooms. Casks were again provided as washing tubs, also proper floors and a system of drainage had to be constructed. The buildings used as drying rooms had to be wired and heating appliances installed. The plumbers and fitters improvised stoves and flues from oil drums, and when the rooms were ready for use it was wonderful what a good job had been made from such unpromising material. A number of local women were engaged as

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washers and menders and they were paid by the Sanitary Officer. The working of these baths and laundries and the distribution of clean clothing to the units took practically the whole time of several of the non-commissioned officers of the Section. A large number of temporary unfit men were attached to the Section for duties at the baths and laundries. This work grew considerably and in the new areas there were permanent laundries employing a large number of women. It became evident that if this work was to continue as part of the work of the Sanitary Section it would inevitably interfere with its purely sanitary work and lessen its usefulness in that direction. Consequently the A.D.M.S. very wisely insisted on the laundry and bathing work being taken over by a special officer (non-medical) who was provided with a staff of men unfit for the trenches. A sergeant from the Section who had gained considerable experience in the working of laundries was attached to the new department for duty. The Sanitary officer and the Section were thus able to devote the whole of their time to sanitation.

The Sanitation of Towns and Villages.—In addition to supervising the work of the regimental sanitary men, the sanitation of towns and of large villages fell to the lot of the personnel of the Sanitary Section. As far as possible the co-operation of the Mayor was solicited, but as a rule very little help was obtainable from the French civil authorities, owing partly to lack of labour. A scheme of scavenging was invariably inaugurated, and carried out by a fatigue party of temporary unfit men attached to the Section, a special non-commissioned officer being detailed to supervise the work. Refuse from billets and messes was daily collected by means of a cart and then taken to a central incinerator. Owing to heavy horse traffic, the streets were dirty, and consequently a system of street scavenging and cleaning had to be adopted. The streets were first watered and then brushed. A watering cart had to be improvised by placing a 200-gallon tank on an old French cart, with a T-shaped pipe fixed behind, the horizontal portion being perforated. It acted admirably, and a little cresol added to the water deodorized the usual street smells. Ditches had to be cleaned out periodically, as they were frequently used by civilians as a dumping place for refuse. In one town, evacuated by the municipal authority, the streets and drainage were in a terrible condition; and as the town, though partly in ruins, was occupied by troops and some civilians, steps

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had to be taken to put the place in a sanitary condition during the hot weather. The work of cleansing the streets, emptying cess-pools, clearing out and repairing drains and sewers damaged by shell-fire, was carried out by a party of civilian labourers, employed for the purpose by the Sanitary Officer. This work was directed and supervised by an N.C.O. from the Sanitary Section. In a short time the damaged town was brought into a good sanitary state, with proper sanitary installations at convenient points for the use of the troops. This satisfactory condition was maintained during the stay of the Welsh Division in the area.

Water Supply.—The health of the troops depended very largely on the purity of the water provided, and everything possible had to be done to ensure a pure supply of drinking water. Specially trained R.A.M.C. men were attached to each unit. It became evident that the duties of the R.A.M.C. personnel for water-duties had to be specifically defined. This was done, and a printed copy distributed to officers commanding units. There was a tendency to use the water-duty men for other purposes. It was made clear that they were not to be employed on fatigue duties by the unit to which they were attached. Water-duties are of first importance, and the work was sufficient to keep the water-duty personnel fully employed. Their primary duty was to provide an adequate supply of drinking and cooking water for all officers and men of the unit, and in addition to take charge of the water-carts, sterilizers and other stores connected with the water-supply of the unit. The men were held responsible for carrying out strictly the prescribed methods of purification. Their carts were frequently inspected without notice, and the water tested to see if the instructions were observed. Immediately after entering a new area, the main water-supplies were investigated, and an official list drawn up and printed at Divisional Head-quarters. This list gave the locality, the map reference, the amount of bleaching powder required per water-cart (110 gallons), and a note on the character of the supply. These lists were distributed to commanding officers and to medical officers of units. Further, the water sergeant of the Sanitary Section and his assistant fixed printed notice boards at the filling points, stating the amount of bleaching powder required for each water-cart. The sources were frequently tested, as the quality occasionally varied; for instance, after heavy rains. All water-carts filled at these authorized sources,

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and all drinking water was clarified and sterilized. The rule as regards clarification was relaxed when water-carts were filled directly from tanks, into which water of known purity was pumped from deep bore holes or from artesian wells, which yielded water of high organic purity; but sterilization with a small quantity of bleaching powder was invariably insisted upon, as a routine disciplinary measure.

Provision of Water in the Trenches.—It was not always easy to provide the troops with sterilized water, when in the trenches. At the same time, ample supplies had to be sent to the front line, otherwise men would make use of the dangerously polluted water found in ditches and shell holes. The following method proved satisfactory: The filled carts were taken to convenient points, accessible to the respective units. (The capacity of a water-cart is 110 gallons, and, therefore, the two water-carts of a battalion, will supply 880 quarts, sufficient to fill the water bottles of the whole battalion.) In addition, a further supply of sterilized water must be sent up daily for drinking and cooking. For this purpose, use was made of empty 2-gallon petrol tins which were cleansed and sterilized before use. The tins were filled with sterilized water from the water-carts, and taken to the front line by men from each company. In other places use was made of light railways or trolley lines which were used to convey R. E. material, &c., to the trenches. Sixty-gallon tanks containing sterilized water were placed on trolleys, and at night conveyed to the line. It was occasionally possible to make use of pumps and wells, fairly near to the communication trenches. In such cases a tank and a clarifier were fixed and the water sterilized on the spot, but frequently these were shelled and rendered useless. Pipe lines conveying water from a distance were in use in some areas, but these were also often damaged by shell-fire and put out of action.

Chemical Analyses.—Each army in the field was provided with a mobile (hygiene) laboratory. These laboratories were fully equipped to undertake a complete chemical and bacteriological examination of water. As a rule the laboratory was stationed at army headquarters, and was under the control of the D.M.S. In addition to this means of obtaining a complete analysis, it was found very useful for a Sanitary Officer to be able to conduct a modified examination at the headquarters of his section. Each section had a number of Horrocks' test cases, and a case for testing

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for metallic poisons. The Welsh Sanitary Section had also been provided with the "Soloid" brand water analysis case, and a little apparatus, and additional reagents for testing for the presence of free ammonia, chlorides, nitrites, &c. These simple analyses, more especially the estimation of the oxygen absorbing power of a water, and the amount of bleaching powder required to achieve sterilization, gave a fair indication of the quality of the given water. Another important chemical estimation was carried out, namely, the estimation of the available chlorine in the tins of bleaching powder supplied to the water-duty personnel of the units. As has been previously mentioned, the water in the carts was frequently tested for the presence of free chlorine in the sterilized water. If no blue colour was manifest after the addition of zinc iodide and starch solution, it was concluded that the instructions regarding chlorination had not been carried out, or possibly the bleaching powder used was of an inferior quality. Strict instructions had been given to all the water-duty men to ensure that the bleaching powder tins were stored in a dry place, and the lids fastened tightly after use, otherwise the powder rapidly lost its free chlorine on becoming damp or on exposure to air. In spite of these instructions we frequently came across tins containing damp and caked bleaching powder. Several samples of such powders were taken, and the amount of available chlorine estimated by the thio-sulphate method. The amount of available chlorine in good commercial bleaching powder should be from 30 to 35 per cent. In some of the samples taken, the percentage was considerably under 30, and in a few instances as low as 20 per cent. This was evidently a serious defect, as the amount of bleaching powder to be used per cart was based on the assumption that the powder contained at least 30 per cent. of available chlorine. Another point of interest in connection with testing for free chlorine in water sterilized by this method is the fact that after a lapse of some hours a certain amount of dechlorination takes place. In that case the addition of the zinc iodide and starch solution would not always produce a blue colour. The water may be quite sterile, but a bacteriological examination would be necessary to prove its sterility. At first there were a few complaints regarding the taste of the chlorine in the water, but the men soon got accustomed to it.

Bacteriological Analysis.—As a mere chemical examination

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cannot be depended on to prove that a water is free from dangerous pollution, a bacteriological examination for the presence of the organisms of the *Bacillus coli* group is always necessary. Such bacteriological work was carried out by a mobile (hygiene) laboratory. When undertaking such work without the resources of a laboratory, one is faced with obvious difficulties. Much may, however, be done by the employment of apparatus of an improvised character. A very useful warm chamber or incubator, based on the suggestion of Professor Delépine of the University of Manchester, was constructed by the Sanitary Section. It consisted of a metal tin box, cubical in shape, with suitable compartments, and a central stoppered receptacle made out of an ordinary 2-gallon petrol tin, for holding hot water, the whole being enclosed in a well-made wooden box lined internally with loose wool. Practical experiments with Burroughs and Wellcome's "Soloid" nutrient media, have given satisfactory and interesting results. In recent experiments with a room temperature of about 15° C., colonies of *B. coli* were obtained from a polluted water, and grown on MacConkey's bile salt agar-agar without difficulty, after twenty-four hours' incubation.

Results of Tests.—The original temperature of the incubator was about 42° C.

After 1 hour the temperature was 40° C. (approx.).
„ 9 hours „ „ 35·5 C. „
„ 24 „ „ „ 28 C. „

The results of a number of bacteriological tests of the above nature were of valuable assistance in determining the character of samples of water.

Sanitation "up the Line."—When a Division was holding a sector of the line, some of the troops were actually in the line and some were resting in camps in the immediate rear. These camps consisted of hutments for officers and men, also mess rooms, kitchens, and the usual administrative blocks. The sanitary area, as a rule, was well sited, and contained fairly well constructed fly-proof latrines, urinals, incinerators and ablution sheds. It may be of interest to describe briefly the methods of sanitation carried out by the 38th (Welsh) Division when actually in occupation of a well-known part of the line. The aim was to prevent the possible introduction of specific disease germs into the bodies of the soldiers, more especially germs of the typhoid and dysentery groups. With this

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object in view, precautionary measures were taken to protect the food supply from contamination by dust, mud, flies and rats. Further, every effort was made to destroy, as far as possible, all sources of infection. Latrines and urinals were rendered fly-proof, and the excreta destroyed by fire. Camp refuse, horse manure, and anything likely to encourage flies, were similarly dealt with.

Sanitation of the Trenches.—The type of latrine in use was the tall latrine pail, fitted with a fly-proof seat, the lid of which was arranged to close automatically as the user rose from the seat. These pails were placed in shelters protected by sandbags. Two pails without covers were also placed in the same structure, to act as urinals. It is obvious that here the excreta could not be burnt, hence cresol solution was invariably added to the empty pails, and the contents buried and covered with at least one foot of earth. Old tins, paper and the usual litter were placed in sandbags hung outside dugouts and cooking places. These were taken down the communication trenches by men detailed for the purpose, and were deposited at marked dumps. At night these were collected by carts and taken down to the transport lines of the unit concerned, to be burnt in the incinerators. The sanitary personnel of the unit in occupation did all the conserving work, under the supervision of the Regimental Medical Officer. The Sanitary Officer of the Division also made periodical visits of inspection, and reported on the sanitary condition of the trenches to the A.D.M.S. It was found essential to keep the trenches clean and sanitary, and quite clear from bits of food, &c. In order to keep down the number of flies and rats, all food was stored in fly-proof and rat-proof boxes. The plague of rats was not only disagreeable, but actually dangerous, as rats are propagators of disease, such as "jaundice hæmorrhagica."

Sanitation of the Camps.—Latrines.—The type of latrine in use in the camps was the tall pail placed in fly-proof timber frames. The seats were provided with self-closing lids. This was usually done by fixing a wooden rail behind the seat, placed so as to prevent the lid being raised to the vertical. The pails could be removed by raising a movable top flap or a movable back flap; if the latter, the frame should be sloped so as to ensure the flaps shutting closely. The pails should fit close up to the woodwork, so that the user does not urinate over the top of the pail on to the woodwork and the ground in front. If the pail was too short to fit closely up to the

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woodwork, a tin flap was tacked in front to guide the urine into the pail. The contents of these pails were invariably burnt. In those areas where the ground permitted, deep trench latrines were dug, and these were rendered fly-proof by placing wooden box seats over them. Tin plates, cut from old biscuit tins, were fitted in front on the inside to prevent fouling with urine. Care was taken that the deep trench latrine and the urine soakage pit were not sited where there was any possibility af polluting the water supply. The pit system does away with the necessity for burning. In many parts of the front they were not permissible, owing to the proximity of the ground water to the surface.

Urinals.—The type of urinal in use was a trough made from corrugated iron sheets, discharging through a pipe into a sealed pit. The pit was about three or four feet square and five or six feet deep. It is filled up to within six to twelve inches from the surface with small burnt tins from the incinerator. All these tins were perforated or broken up. Some soil was replaced on the top, and the pit made fly-proof. The trough and pipe were easily kept sweet and free from flies by washing down with a little cresol solution. Instead of the trough, oil drums or biscuit tins, fitted into each other, cut and perforated, were also used in some cases.

Incinerators.—There is no need to describe the various forms of open incinerators; they are well known, and serve the purpose very well under certain conditions. The best type of incinerator is undoubtedly the "double-decked" or two-chamber incinerator. This type can be used in all weathers, and burns effectively all refuse and excreta. There are really three chambers, viz.: the drying chamber, the fire chamber, and a small ash chamber. The incinerator is set going by placing a quantity of litter and dry refuse in the fire chamber; the greater the quantity of combustible matter the better. Once the fire is well lit, the incinerator works well, and develops great heat. The contents of the latrine pails are first drained of superfluous urine into fly-proof soakage pits. The excreta is then emptied on the drying plate in the drying chamber, this being done through the top hole feed. All the heat and smoke from the fire chamber must pass over the excreta on the drying plate. In this way the excreta is very soon dried, and then it is raked into the furnace below. The efficient working of an incinerator depends very largely on the stoker. These incinerators want intelligent and constant attention, and the best results were

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obtained when the stoking was done by a permanent orderly. The disposal of the surplus urine from the pails in the way indicated was quite satisfactory. There are ingenious methods in vogue for separating the liquid from the solids, such as the dual-tin system of latrines, &c. These methods may be adopted with success in institutions where they may receive constant attention, but they are useless in large camps. Sawdust, if available, is a useful addition to the latrine pails.

Manure.—The disposal of horse manure was a difficult problem, but one that required to be seriously dealt with. In back areas, the manure could be handed over to the farmers, and where this was done, steps had to be taken to ensure prompt and regular removal, and wherever possible, its immediate spreading on the farm lands. Where the system of manure dumps was adopted, the dumps had to be situated as far as possible from the billets of troops, and the manure tightly packed, sprayed with cresol solution and afterwards covered with soil. This Sanitary Section carried out several experiments in order to discover the best method of dealing with manure. The application of larvicides in the form of chemical solutions, e.g., cresol, kerosene, formalin, borax, "C" solution, &c., was tried, and also the bio-thermic or fermentation method was given a trial. These were fairly successful, but after considerable experience it was found that the best practical method was burning the manure by means of specially constructed incinerators. The following method proved successful in dealing with large quantities of manure from the horse lines of the Divisional Ammunition Column of the 38th (Welsh) Division: A platform of concrete or bricks about 24 ft. square was prepared with a slight fall from the centre to the sides. (Instead of this the ground can be prepared to serve as a platform.) Four pairs of corrugated iron sheets were riveted together, the proximal sheets were well perforated with holes about an inch square. These sheets were then bent in a semicircular fashion and set on the platform, leaving a space of about a yard square in the centre. In this central space an entangled mass of old wire was piled up as a coné and the wire was made to cover partly and overhang the proximal perforated sheets in order to protect the ventilating perforations. Over this cone some dry litter and a little wood were placed and a fire started. The manure was then heaped evenly and systematically on the wire and the cone shape of the heap

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maintained. The object of the bent sheets is to act as air ducts, the leeward end of the shafts being blocked when a wind is blowing, so that the air current may travel upwards through the cone and feed the central fire. By this method the manure is always burning from within outwards and the fire is maintained for weeks even in spite of wet weather. Several of these incinerators were needed to cope with the manure from the horse lines of a Divisional Ammunition Column.

Protection of Food.—One of the most important duties of the Sanitary Officer of a division was to ensure that the food supply of the men was preserved from contamination. For this purpose an occasional visit to the divisional and brigade ration "dumps" or refilling points was required. It was necessary for him to work with the supply officers, and if tact was exercised, he could soon gain their co-operation. A great deal could be done to protect the meat and other articles of diet from being contaminated by dust, dirt or mud during the process of distribution at the "dump" to the various units. At first it was noticed that, owing to carelessness, food was left without any protection from contamination at the dump (on the roadside), and during transport to units. It was aimed to see that the waggons carrying the rations to the various units were clean, and the meat, cheese, bread, &c., covered, and that the man in charge did not sit on the food—a common occurrence. The quartermaster's stores were also frequently inspected, to see that they were kept scrupulously clean and the food protected, as far as possible, from flies and rats. This was not always possible, especially if the unit was frequently moving from place to place, and any old barn or building had to serve as a food store; but much was done in the way of improvisation. A supply of muslin proved of great service under these conditions. In the camps again, the food stores required more attention, for here the meat was cut up and the tins opened. Every effort was made to store the meat, bread, cooked food, opened tins, &c., in fly-proof safes. In standing camps, standard meat safes were provided from R.E. workshops. Frequently, however, units had to improvise safes.

Cooks and Cook-houses.—Cook-houses required constant attention. Cooks are very apt to become careless, dirty and greasy. Hence it was necessary to provide them with ready means of washing their hands, &c., so that they might be clean in person.

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They were also required to wear clean overalls. It was found to be a safe rule to prohibit any man who had suffered from dysentery or enteric fever from acting as cook. It was also found a wise precaution to warn the cooks to report at once to the regimental medical officer if they suffered from diarrhœa. Cooks were prohibited from sleeping in the cookhouse, and the practice of hanging clothes, especially shirts, dirty socks, &c., was stopped. To enable the cooks to keep the cook-houses and utensils clean, they were provided with scrubbing brushes and washing soda, also a liberal supply of dish cloths. I was frequently shown a dirty, filthy old rag for a dish cloth. When possible, baked clean sand was used for scouring out kettles, dishes, &c. The wood fires generally in use yielded an abundant quantity of wood ashes, which served the same purpose as the sand. Every effort was made to prevent the cooks and the men from cleaning their cooking utensils and mess tins in dirty ditch water, and using dirty sand or soil for scouring them out. One of the reasons for the dirty appearance of the cooks was the smoke and dirt that naturally arose from the open trench kitchen that was practically always in use in temporary cook houses. To make a closed oven, corrugated iron sheets and a number of iron bars were required. For an officer's mess, a smaller size was made to serve the purpose, and a few additions could be made. The oven could be made of an empty oil drum. One or two small petrol tins (2-gallon tins), could be fixed in front of the oven to be used for boiling water. A 2-gallon petrol tin could also be fixed above the oven for warming plates.

Disposal of Waste Water.—Waste water from ablution places and cook houses was required to undergo some form of treatment, previous to its discharge into ditches or streams. All the soap and grease possible had to be removed, otherwise it would form a black scum in these water courses which rapidly became offensive and attracted flies. Several methods of treatment were in vogue. The following was easily improvised and gave good results in dry ground. Two square pits were dug in line with each other, leaving a foot of ground between them. They were made large enough to deal with the waste water to be treated. The pits were connected at the bottom with a drain pipe or, what served the purpose equally well, an empty oil drum with the bottom and top removed. The first pit was filled to three-quarters of its depth with coarse filtering material. The first layer which was laid to the top level

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of the connecting pipe, consisted of perforated or flattened tins which had been through the incinerator. The next layer consisted of clinker or coarse ashes, if available, otherwise coarse gravel or broken brick would do. In the centre and on the top of this rested an oil drum, with perforations at the sides and bottom. The drum was now surrounded with filtering material to within 6 in. of the top of the pit. The soil and sods were replaced and the pit sealed, the oil drum being properly fitted in but removable. The second pit was next converted into a filter. The connecting pipe and the lower portion was filled with small flattened or perforated burnt tins. The middle layer was of fine filtering material such as coke, breeze or sand, and the upper layer of coarse material such as gravel or broken brick. From the second pit a drain was cut to the nearest ditch or water course; this drain was also filled with filtering material. The installation worked in the following way: The oil drum in the first pit was packed with straw and this was sprinkled with a little chloride of lime, which helped to separate out the grease and to keep the installation sweet. The greasy water was poured out on the straw which entraps some of the grease, bits of soap, &c. The waste water filters downwards through the first pit and upward filtration takes place in the second pit, and the water is further filtered in the drain. The resulting effluent is fairly good. In gravelly soil a great deal of the water will be absorbed. The straw in the oil drum will require changing daily, the old straw being burnt in the incinerator. These filters were found to serve the purpose very well and were suitable for the field, being easily constructed and requiring no special material. In water-logged ground the same principle was applied by dividing a box with two compartments and fixing a perforated oil drum in the first compartment. The joints of the box were made water-tight with tar or puddled clay. Again the effluent was made to discharge into a drain filled with burnt tins or rubble (the longer the drain the better) before it was finally discharged into a water course. Care had to be taken to ensure a uniform fall in the drain. All these installations required the daily attention of the sanitary personnel of the camp, otherwise they soon got out of order. In one of the areas occupied by the 38th (Welsh) Division, owing to a shortage of water during the late summer months, very special precautions had to be taken to purify the waste water from baths, laundries and ablution sheds. The streams were low and formed

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the only source of supply for the troops and civilians. (Drinking water was obtained elsewhere.) It was, therefore, essential to guard the streams from pollution. In some instances ablution water was so short, that the same water had to be used over and over again. The method adopted consisted in treating the water containing grease or soap with chloride of lime. The fatty acids combined with the lime to form a thick scum which rose to the surface. This scum was easily removed and after drying, burnt in the incinerator. The resultant liquid was fairly clear and sterile, and after passing through a filter, discharged into a stream or pond and did not create a nuisance; if necessary, it was conducted into another tank to be used over again for ablution purposes. The artisans of the Section constructed several installations for carrying out this treatment. They consisted of two concrete tanks and a filter. The two tanks were necessary for alternate use; when one had been filled, the flow of the waste water was directed into the other. In the meantime the full tank was treated by the addition of a thick emulsion of chloride of lime, and the whole well mixed in the tank. The amount of chloride of lime required varied with the quality of the waste water treated, ranging from ½ lb. to 4 lbs. per 100 gallons. The quantity is best determined by experiment and experience, and if the exact quantity necessary be used, the resulting effluent is no harder than the original water.

Disinfection and Investigation of Infectious Diseases.—All the cases of infectious diseases reported to the A.D.M.S. were passed on to me as Sanitary Officer. Immediately on receipt of such a report, the unit concerned was visited, and inquiries were made as to possible source, &c. Contacts were at once segregated, if this had not been done already by the Regimental Medical Officer. If the case was one of the infective intestinal type, the medical histories of the contacts and of the regimental cooks were thoroughly investigated. If there was anything to suggest the possibility of a contact being a "carrier," or if one had recently suffered from dysentery or enteric, he was sent to a casualty clearing station for further examination by a bacteriologist. The contacts of diphtheria and cerebro-spinal fever had their throats swabbed; those that gave positive results were sent to a casualty clearing station, whilst those that gave negative results were returned to duty. In the case of the contacts of the *Exanthemata* they were only partly segregated; they slept apart from the other

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men, and were examined daily for the period of incubation of the disease, but their military duties were interfered with as little as possible. The premises in which the infection occurred were disinfected by spraying with a solution of formalin. Bedding and wearing materials exposed to infection were subjected to disinfection by steam.

Treatment of Verminous Conditions.—Each division was provided with a Double Thresh Disinfector on a Foden Steam Lorry. The steam disinfector attached to the Sanitary Section proved very valuable in the campaign against lice. Directly the men returned from the trenches to the rear camps, they were given a warm bath and a change of underclothing. If nothing further was done, the men were soon re-infected with vermin from their khaki. Arrangements were made to send the Foden steam disinfector to the baths, and the men's tunics and trousers were put through the disinfector. This resulted in comparative freedom from vermin, provided that the process was repeated at fairly frequent intervals. It was found at a later stage that steam at a lower temperature was quite effective in destroying lice and their eggs. Consequently, special steam chambers were constructed, to which current steam from 60° C. to 70° C. was admitted for twenty minutes, and a current of air afterwards for ten minutes to dry the clothing. This method was cheaper and just as effective as the Foden steam disinfector for delousing purposes. In addition to the Foden, the Welsh Sanitary Section worked a Clayton disinfector. This installation was used for the disinfection of clothing which would be injured by steam, and, in addition, the blankets and clothing of cases of itch, on which sulphur has a specific effect. It certainly had a very decided action in checking an outbreak of scabies which occurred among the drivers of the Artillery Waggon Lines and of the Divisional Ammunition Column. Arrangements were made with the Headquarters of the Divisional Artillery for all these men to attend in sections at the disinfecting depôt of the Sanitary Section. The men had already had a bath and a change of underclothing; the next step was to expose their breeches and tunics to sulphur dioxide in the Clayton chamber. The clothing was well saturated with SO_2, and the vermin and the *Acarus scabiei* were destroyed. This process was only used as a preventive measure. Actual cases of scabies were, of course, sent to a Field Ambulance.

Canteens and Estaminets.—Another preventive method, which

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proved very valuable against the spread of infectious diseases—especially diphtheria and other throat affections—was the institution of a system of sterilization for all drinking vessels used in common by the troops. A considerable number of cases of diphtheria occurred in some of the Divisions at the front, and in consequence an Army Order was issued to the Divisions regarding the precautions to be taken. The inspection of canteens and estaminets in the area occupied by the troops was to be carried out by the Sanitary Officer and his staff. Those in charge of such places had to provide means for the sterilization of all drinking vessels every time after use by soldiers. Each innkeeper or man in charge of a canteen had to provide a vessel, with an adequate supply of safe water, changed frequently, also a suitable clean cloth. Each glass or mug, after being thoroughly washed, was either (1) dipped momentarily in a vessel containing water kept continuously on the boil, or (2) placed in a solution of permanganate of potash of a port wine colour for five minutes. They were then washed in safe water and placed on a rack and allowed to dry. A list of all estaminets in the area (they were very numerous) was drawn up, also a similar list of all regimental wet canteens, Y.M.C.A. and Church Army huts. These were all visited, and the requirements explained; explanatory leaflets in French and Flemish were distributed among the estaminet keepers. At first we experienced a lot of trouble with the estaminets, but after frequent visits of inspection we at last succeeded in procuring observance of these measures. Two or three estaminets were placed "out of bounds" for non-observance of these precautions, and this punishment had an immediate and salutary effect on the other estaminet keepers. The results of these precautions were apparently very good, inasmuch as no cases of diphtheria occurred in the Division during the time these regulations were in force.

Organization of a Sanitary Section.—To obtain the best results from a Sanitary Section, it is of importance that it should be properly organized into Sub-sections, each sub-section to have definite duties. The Welsh Sanitary Section was divided into four sub-sections: (*A*) Administrative Sub-section, (*B*) Water-duty Sub-section, (*C*) Inspectorial Sub-section, (*D*) Constructional Sub-section.

(*A*) *Administrative Sub-section.*—This carried out all administrative and routine clerical duties. The preparation of maps, sketches, plans of buildings for baths, laundries, &c., also plans of sanitary installations, were all done by the personnel of this sub-section.

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(*B*) *Water-duty Sub-section.*—It was the duty of the water-sergeant and his assistants to investigate all the available water supplies in the district, and to draw up a list of water-points for filling water-carts, and of the available cooking water. These sources were tested and afterwards marked with notice boards stating the amount of bleaching powder per water-cart. Further duties included the inspection of water-carts and the instruction of men detailed for water-duties.

(*C*) *Inspectorial Sub-section.*—This was the largest sub-section, and all the personnel were acting non-commissioned officers. These were again sub-divided into small sanitary detachments, stationed at convenient points for the sanitary inspection of the area. Those in the forward area were generally billeted in the Advanced Dressing Stations and they rendered considerable assistance to Infantry and Artillery medical officers.

They also kept in touch with Staff-Captains of Brigades, and reported verbally any existing insanitary condition, and thus they frequently obtained a fatigue party to carry out their instructions. In the back area, inspections were made of all billets and sanitary installations and arrangements generally. The sanitation of towns and villages was also under the supervision of the personnel of this sub-section.

Each detachment was provided with a McKenzie spray and a supply of disinfectants for the purpose of carrying out disinfection of the premises, huts, &c., whenever necessary. They also gave considerable assistance to the Water-duty Sub-section in their own immediate area.

(*D*) *Constructional Sub-section.*—A workshop was necessary for the personnel of this sub-section, and in this the artisans were able to do a considerable amount of good work, such as the preparation of sanitary appliances of all kinds, fly-proof box-latrines, urinals from oil drums or petrol tins, the improvisation of all kinds of appliances from biscuit tins, &c., and the construction of models for instruction. The artisans constructed brick incinerators, baths, shelters, &c. The plumbers and fitters did all the repairs in connection with the boilers and sprays of the Divisional Baths.

Instructional Work.—Owing to casualties in the personnel of the sanitary squads and water-duty men of the various units, it was necessary to replace them by untrained men. Hence, therefore, it was found essential to hold periodically, small schools of instruction

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in sanitation at places convenient for the men. These men were given full instructions in the principles of Sanitation in the Field, and were taught, practically, how to improvise sanitary installations. The men detailed for water-duties were likewise instructed in the principles of water-supplies, and were given practical demonstrations in the use of the water-cart. Latterly new units, mostly labour companies, arrived in large numbers, and it was found that they detailed untrained men both for sanitary and water-duties. Arrangements were made also to instruct these men, and this resulted in these new units coming into line with the other units. Thus, by paying special attention to these new units as they arrived, a good standard of sanitation was maintained throughout the area. As time went on, it became evident that sanitation generally would be more efficient if uniformity of methods and standardized installations were adopted. This was eventually achieved by the formation of a Corps School of Sanitation. At this school, standardized models made by the section were demonstrated and became adopted generally. A similar set of models was demonstrated at an Army School of Sanitation for Regimental Medical Officers.

The frequent movements of Divisions during active operations militated somewhat against that efficiency in the service that might otherwise have been attained; for the work at times was interrupted, and therefore lacked continuity and co-ordination. Seeing this, the authorities concluded that better work would be done by Sanitary Sections as stationary units. Consequently the Sections were withdrawn from their Divisions and placed in charge of definite areas, either directly under the D.M.S. of an Army or the D.D.M.S. of an Army Corps. The results obtained fully justified the re-organization. Under these new arrangements the 77th (Welsh) Sanitary Section was given charge of a large Training Area. The work was very similar to that already described, viz., the organization of sanitary arrangements of billets, villages and small towns; the investigation of water supplies and the preparation of a schedule of all authorized water-points, and the erection of notice boards at these authorized sources. The Sanitary Officer was notified of all cases of infection among civilians, and, in conjunction with the Mayor of the Commune, he took steps to prevent the spread of the disease to the troops and civilians.

Conclusion.—The work of Sanitary Sections proved of great

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value to the Army in the field, and favourably impressed the French authorities. It will undoubtedly expedite the development of sanitation in France. The French Army adopted Sanitary Sections on similar lines to the British. As Sanitary Sections, our work frequently brought us into touch with Mayors of Communes and French medical authorities, and much educational work was done in the villages and towns. The civilians learned that there is a connection between polluted water and infectious disease; that wells must be protected; that it is wrong to dip a dirty bucket into a well; that flies carry disease, and therefore their breeding places must be destroyed; that open cesspits and offensive middens in front of the houses are dangerous; in short, it was brought home to the urban and rural population of France that in foul conditions lurks disease, and that health follows in the train of sanitation. Further, the instructions given to, and the sanitary discipline maintained by, all ranks in the British Army are bound to result in an awakening of the sanitary conscience at home. These men, who were mainly civilians, and who represented all classes of the community, will take a greater interest in sanitary problems than hitherto. This will surely make for progress and development in sanitary matters in Great Britain.

THE BRUSSELS CONGRESS, 1920.

Thursday, May 20, to Monday, May 24, inclusive.

FELLOWS and Members are reminded of the above Congress, and that it would be a convenience if the names and addresses of those intending to be present, and whether accompanied by ladies, were sent to the Honorary Secretaries without delay. Special arrangements have been made for travelling and hotel accommodation.

The Congress will be conducted in the following Sections: (1) State Medicine; (2) Naval, Military, Tropical and Colonial; (3) Municipal Hygiene; (4) Industrial Hygiene; (5) Hygiene and Women's Work; (6) Bacteriology and Chemistry. Fellows and Members desirous of reading Papers should communicate with us at once.

The Congress will be held in the University Buildings, Leopold Park.

E. W. HOPE,
T. N. KELYNACK,
Hon. Secs.

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Chemical Notes.

BY
ALAN W. STEWART, D.Sc., A.I.C.
Demonstrator of Chemistry in The Royal Institute of Public Health.

Prosecutions for Adulteration of Foods, &c. (*British Food Journ.*, vol. xxi, No. 243-248).—*Salad Oil.*—At Kensington a grocer was fined £5 and 3 guineas costs for selling salad oil which consisted of mineral oil artificially coloured. The adulterant was liquid paraffin. *Tea and Milk Tablets.*—At Bishop Auckland a grocer was ordered to pay £2 16s. 6d. costs in a prosecution for milk tablets containing 5 per cent. calcium carbonate and 15 per cent. starch. *Almond Oil.*—At the Mansion House a firm of chemists were fined £15 and 3 guineas costs for selling almond oil containing 55 per cent. of mineral oil. *Self-raising Flour.*—At Watford a firm were summoned for selling self-raising flour containing 1·2 per cent. of calcium sulphate. Acid calcium phosphate should not contain, when properly prepared, more than 10 per cent. of the sulphate, and as 2 per cent. of the phosphate is normally used in self-raising flour, the amount of calcium sulphate in the latter should not exceed 0·2 per cent., equivalent to 14 gr. per pound. It was held that a technical offence had been committed and a fine of 10s. with 15s. costs was imposed. *Dirt in Milk.*—At Liverpool a dairyman was fined £2 and costs for selling milk containing 39 parts of dirt per 100,000 parts of milk. It was stated that 5 parts per 100,000 would be perceptible but 2 parts per 100,000 should not be exceeded. *Tartaric acid in Vinegar.*—At Newcastle a grocer was prosecuted for selling vinegar containing 3·8 per cent. of tartaric acid. The defendant claimed that it was sold as a vinegar substitute.

The Determination of Iodide in Mineral Waters and Brines (W. F. Baughman and W. W. Skinner, *Journ. Indust. and Engin. Chem.*, vol. xi, No. 6).—A quantity of the water representing not more than 0·1 grm. of iodine as iodide nor more than 10 grm. of total salts, is made up to a volume of 100—150 c.c. Boil with sufficient sodium hydroxide and carbonate to precipitate calcium and magnesium salts. Filter off and wash the precipitate with hot water, receiving the filtrate into an Erlenmeyer. Adjust the volume to about 100 c.c., neutralize with dilute H_2SO_4 and add 1 c.c. of 4 per cent. NaOH. Heat to boiling, add an excess of potassium permanganate, continue to heat until the precipitate commences to agglomerate, then allow to cool. Add sufficient alcohol to cause the pink colour to disappear and allow the precipitate to settle on the water bath. Filter and wash with hot water. The filtrate when cold is treated with 1 or 2 grm. of KI, acidify with HCl and titrate the liberated iodine with standard thiosulphate solution. The number of cubic centimetres required, divided by 6 represents the number of cubic centimetres required by the iodine originally present in the sample. The permanganate oxidizes the iodide into iodate and the latter acts on the excess of iodide which when acidified, causes the liberation of free iodine, which is titrated with sodium thiosulphate.

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Reviews.

Cerebro-spinal Fever. By Captain C. Worster-Drought, M.A., M.B., and Captain A. M. Kennedy, M.D. London, 1919: A. and C. Black. Pp. 514. Price 30s.

Considerable progress has been made during the past few years in the bacteriology and treatment of cerebro-spinal fever, and the outbreak in this country in 1915 afforded exceptional opportunities for its study. The authors who were in charge of the disease among the troops in the Woolwich Military District were fortunately placed for the investigation in all its aspects since they were respectively Neurologist and Pathologist, and Bacteriologist. This monograph gives much information on the results of this work including observations extending over a period of more than three years. The text matter is arranged under twenty chapters and the bacteriology of the meningococcus and allied organisms is fully dealt with in the second chapter occupying twenty-one pages. The Symptoms, Course, Complications, Diagnosis, and Treatment are each treated in separate chapters. Full instructions are given for performing lumbar puncture and the intrathecal administration of serum, with illustrative photographs of the operation. The important question of "contacts" and "carriers" is amply treated and there is a chapter on the cerebro-spinal fluid including chemical, bacteriological and cytological methods. This is a standard scientific work on the etiology, symptomatology, diagnosis and treatment of cerebro-spinal meningitis. It will prove invaluable to all those who at any time may have to deal with the disease either in epidemic or sporadic form. There are eight good plates and fifty-six line illustrations and charts which materially add to the value of this treatise.

A Compend on Bacteriology including Pathogenic Protozoa. By Robert L. Pitfield, M.D. Third Edition. Pp. 279. Price $1.50. *A Compend of Medical Chemistry.* By Prof. Henry Leffmann, M.A., M.D. Sixth Edition. Pp. 241. Price $1.50. *A Compend of Genito-urinary Diseases and Syphilis.* By Charles S. Hirsch, M.D. Third Edition. Pp. 347. Price $1.50. Philadelphia: P. Blakiston's Son and Co.

To meet the requirements of the medical student preparing for examination, Dr. Pitfield has designed an excellent *Compend on Bacteriology*, which should also prove acceptable to practitioners desirous of becoming acquainted with the growing science of bacteriology. The chapter dealing with the vast subject of immunity is deserving of special mention and contains an outline of the essential accepted teachings on that subject. The present edition is the third. It has four plates and eighty-two other illustrations.

In his *Compend of Medical Chemistry*, Prof. Leffmann gives full information on his subject, which has been divided into four main parts, viz.: General Principles, Descriptive Inorganic Chemistry, Descriptive Organic Chemistry, and Clinical Chemistry. In the latter are included the analysis of milk, stomach contents, urine. This book will prove valuable to beginners and students of chemistry as it gives all that is necessary and nothing that is superfluous. The fact that it is now in its sixth edition is sufficient testimony to its popularity.

In issuing the third edition of his *Compend of Genito-urinary Diseases and Syphilis* Dr. C. Hirsch has taken the opportunity to subject the entire work to a careful scrutiny and revision and in order to bring his subject matter up to date, many important changes have been effected. The writer gives the best and approved methods of diagnosis and treatment, which are accepted by all urologists and syphilographers. The chapter on cerebro-spinal syphilis has been entirely rewritten. A commendable feature of this useful compend is its judicious brevity so that one gets a résumé of the entire field in a small and compact volume.

The above manuals are some of the publishers' quiz-compends: they are based on popular text-books and the lectures of well known professors, and being

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constantly revised they represent up-to-date knowledge on the subjects treated. They are well arranged, thorough and concise and contain much information not elsewhere obtainable in such a condensed and practical manner. They should prove of much value to students of medicine and practitioners.

John Coakley Lettsom and the Foundation of the Medical Society of London. By Sir StClair Thomson, M.D., F.R.C.P. London, 1918: Harrison and Sons. Pp. 63. Price 2s. 6d.

This brochure contains the Presidential Address delivered by the author before the Medical Society of London in October, 1917. The distinguished writer has a keen and artistic sense of biographical values. He gives an excellent pen-picture of the celebrated John Coakley Lettsom, M.D., F.R.S., who founded the first of all the Medical Societies of London, in the year 1773. This essay is well worth reading as it gives a good picture of the medical and social life of the Georgian period and portrays the founder in a clear and sympathetic manner.

Influenza. A Discussion opened by Sir Arthur Newsholme, K.C.B., M.D. London, 1919: Longmans, Green and Co. Pp. 102. Price 8s. 6d.

This booklet contains a full report of the Discussion on Influenza which was held at a meeting of the Royal Society of Medicine in November, 1918. A good number of well known experts figure amongst the speakers and much information was given from a military, naval and civilian standpoint. In view of the possibility of another epidemic this publication should be carefully read by all medical men and those responsible for the health of the community.

Mothercraft. London, 1919: The National League for Health, Maternity, and Child Welfare, 4, Tavistock Square, W.C.1. Third Edition. Pp. 324. Price 5s.

This excellent manual contains a selection from courses of lectures on infant care delivered under the auspices of the National Association for the Prevention of Infant Mortality, a society which has and is doing such good work in its endeavour to bring about a reduction in the deplorable loss of infant life. The table of contents includes lectures on a variety of subjects each written by an acknowledged authority; the development, birth, care, feeding, hygiene, &c., of the infant are adequately dealt with, as well as infectious and respiratory diseases. Mention must also be made of Venereal Disease in relation to dead-birth and infant mortality; these two lectures at once arrest one's attention. Much useful and fundamental information is clearly and concisely given in this book which we cordially recommend to the careful study of all nurses, health visitors and particularly to mothers, present and future.

Commerce and Industry. Vol. I. Historical Review. Pp. 508 with 7 maps. Price 32s. Vol II. Statistical Talks. Pp. 260, Price 24s. London, 1919: Constable and Co.

The first volume of this excellent treatise gives a good historical review of the economic conditions of the British Empire from the Peace of Paris in 1815 to the Declaration of war in 1914, based on Parliamentary Debate. The object of this work is to show the sequence of events during the past century which have led to the present state of trade and industry and all that depends upon them. Public opinion from time to time as represented by debates in the Houses of Parliament is impartially set forth and supplemented by reference to standard authorities. This book will not only serve as a text-book for the use of politicians and political economists but will be read with much interest and profit by financiers, merchants, social reformers and all who desire information on the progress of commerce and industry of the Empire and the questions of reconstruction which are now under general consideration.

Volume II. contains valuable Statistical Tables going back to the end of the Napoleonic wars. They have been compiled with the object of forming a work of

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reference both for the library and the office and have been arranged so as to be specially useful for comparative purposes. This volume forms a necessary supplement to the previous one and both are invaluable as reference books to all who are interested in the economic movements of our time.

A Primer of Tropical Hygiene. By Col. R. J. Blackham, C.M.G., C.I.E. Bombay, 1918: G. Claridge and Co. Fifth Edition. Pp. 154. Price one rupee.

This is a very handy little book which can conveniently be carried in one's pocket. The fact that it has passed through four editions in almost as many years is evidence of the popularity it enjoys. A considerable amount of new matter has been added and opportunity has been taken to thoroughly revise the subject matter. This little primer contains a large amount of useful information on all sanitary and public health questions, useful alike to Europeans and Natives of India. It should be widely circulated and read by all those, particularly the lay people, who live in India and the Tropics.

Tropical Hygiene. By the late Surgeon-General Sir Pardey Lukis, K.C.S.I., and Col. R. J. Blackham, C.M.G., C.I.E. Calcutta and Simla, 1918: Thacker, Spink and Co. London: W. Thacker and Co. Third Edition. Pp. 295. Price 6s.

This work is a second impression of the Third Edition which was published in 1915, and this fact would seem to be evidence of the popularity it enjoys. The present impression has been carefully revised and brought up to date. There is a full description of hookworm disease, goat's milk and Malta fever; there are also two good chapters on sanitation of camps, and hydrophobia in the Tropics. Like its predecessor, this edition will be very useful to students of elementary hygiene, and to junior practitioners and students of medicine in tropical and sub-tropical climates.

Report of the Proceedings of a National Conference on Infant Welfare. London, 1919: National League for Health, Maternity, and Child Welfare, 4, Tavistock Square, W.C. Pp. 222. Price 1s. 6d.

A National Conference on Infant Welfare was held at Kingsway Hall on July 1, 2 and 3, under the Presidentship of the Minister of Health, Dr. Christopher Addison, M.P., and the *Proceedings* have now been published in a handy form at a modest price. The Conference was a great success and the seating capacity of the large hall was taxed to its utmost, some 800 to 900 persons being present. All the leading medical and sociological men and women who have made the study of infant welfare a speciality were present, and an excellent variety of papers dealing with all aspects of the subject were read, and followed by useful discussions. The preservation of infant life should be the nation's first care, and it was a happy coincidence that the opening address was delivered by Dr. Addison on the very day on which the Ministry of Health officially came into being. These *Proceedings* should be widely read and distributed and Medical Officers of Health and all others responsible for infant welfare should make a careful study of them.

The Medical Annual, 1919. Bristol: John Wright and Sons. Pp. 562. Price 20s.

This is the thirty-seventh year of publication of this well-known and popular year-book of Treatment, and Practitioner's Index. It constitutes a review of the world's progress in medicine and surgery and is arranged alphabetically for easy reference. The new volume is of unusual value and interest. The experiences gained in the War have produced advances in medical science and practice which, under ordinary conditions, would have required many years to teach. This progress is ably chronicled and adapted in every possible way to the requirements of the civil as well as the military practitioner. The *Medical Annual* will give much valuable assistance to civilian doctors who in the immediate future will be confronted with the after-war problems in the treatment of the wounded, broken

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and nerve-shattered men being discharged from the military hospitals in increasing numbers. It is a necessity to all members of the medical profession. They will find in it the latest knowledge on any special subject with the minimum of expense and inconvenience.

New Town. Edited by W. R. Hughes, M.A. Issued by the New Town Council, 27, Chancery Lane. London, 1919 : J. M. Dent and Sons. Pp. 141. Price 2s.

This handy little book contains a proposal in agricultural, industrial, civic, educational and social reconstruction. It describes in outline a proposal to found a new Country-Town in England in such a spirit and plan as shall appeal to the hearts of all who seek freedom and fellowship. It is not merely a housing reform scheme, but aims at touching upon almost every branch of the great and complex human art of living together, and the scheme is a contribution towards that reconstruction and transformation of our national life after the war. The New Town Council consists of about fifty persons and a corporate body known as The Pioneer Trust, Ltd., has been formed to prospect for a suitable site. The ideals set forth in this book are praiseworthy, and it may be said that the ultimate object of the promoters is to provide the right conditions of life for the full development of human personality.

Sanitation Practically Applied. By Harold B. Wood, M.D., D.P.H. New York : John Wiley and Sons. London : Chapman and Hall. Pp. 473. Price 13s. 6d.

This work has been written for the benefit of both the medical and lay classes. It has been conceived on broad lines, and being free from technicalities it will appeal to the general reader. Throughout it one is impressed by its being an eminently practical book, and hence the author intends it as a corollary to the numerous good treatises on the theory of hygiene. The subject matter is treated in twelve excellent chapters, dealing with a variety of subjects, such as the control of communicable disease, child welfare, school hygiene, water, sewage disposal, clean milk and pure food, &c. The illustrations are original drawings and photographs made by the author, and are intended only as explanatory to the text. This book will prove helpful to health officers, students of public health and municipal officials, as well as to employer and employee.

Health Resorts of the British Islands. Edited by Neville Wood, M.D. London, 1919 : University of London Press. Second Edition. Pp. 253. Price 6s.

This work has been compiled with the assistance of an Advisory Committee appointed by the Council of the Section of Balneology and Climatology of the Royal Society of Medicine. The second edition now issued, appears at an opportune time, as for various reasons many patients will be prevented not only at present, but perhaps for many years to come, from going to the famous centres of hydrology on the Continent. As the author points out, it is unfortunate that medical men coming from our own dominions abroad should have to go to the Continent for instruction in hydrotherapy which we cannot at present provide for them. In Dr. Wood's book, the lesser as well as the more known British watering-places are mentioned and a good deal of useful information is given as to their claims concerning baths, climate, sunshine, &c. Throughout the text there are forty-one good illustrations as well as three maps. Mention must also be made of the useful analytical data given concerning the various waters. Some places are necessarily reported better than others and it is evident that the best accounts have been afforded by medical committees and societies. The author's work constitutes an excellent guide to the more important Health Resorts of the British Isles.

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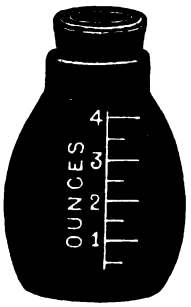

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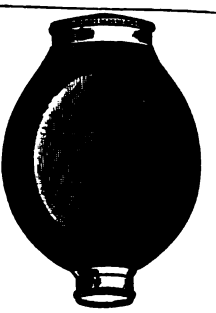

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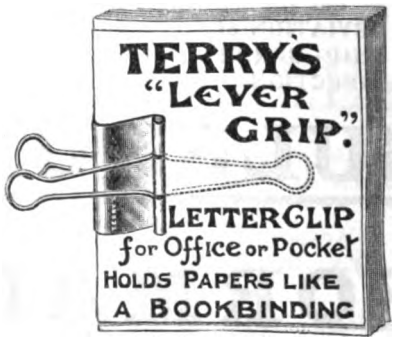

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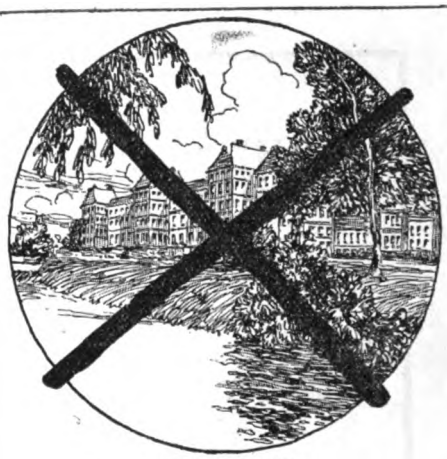

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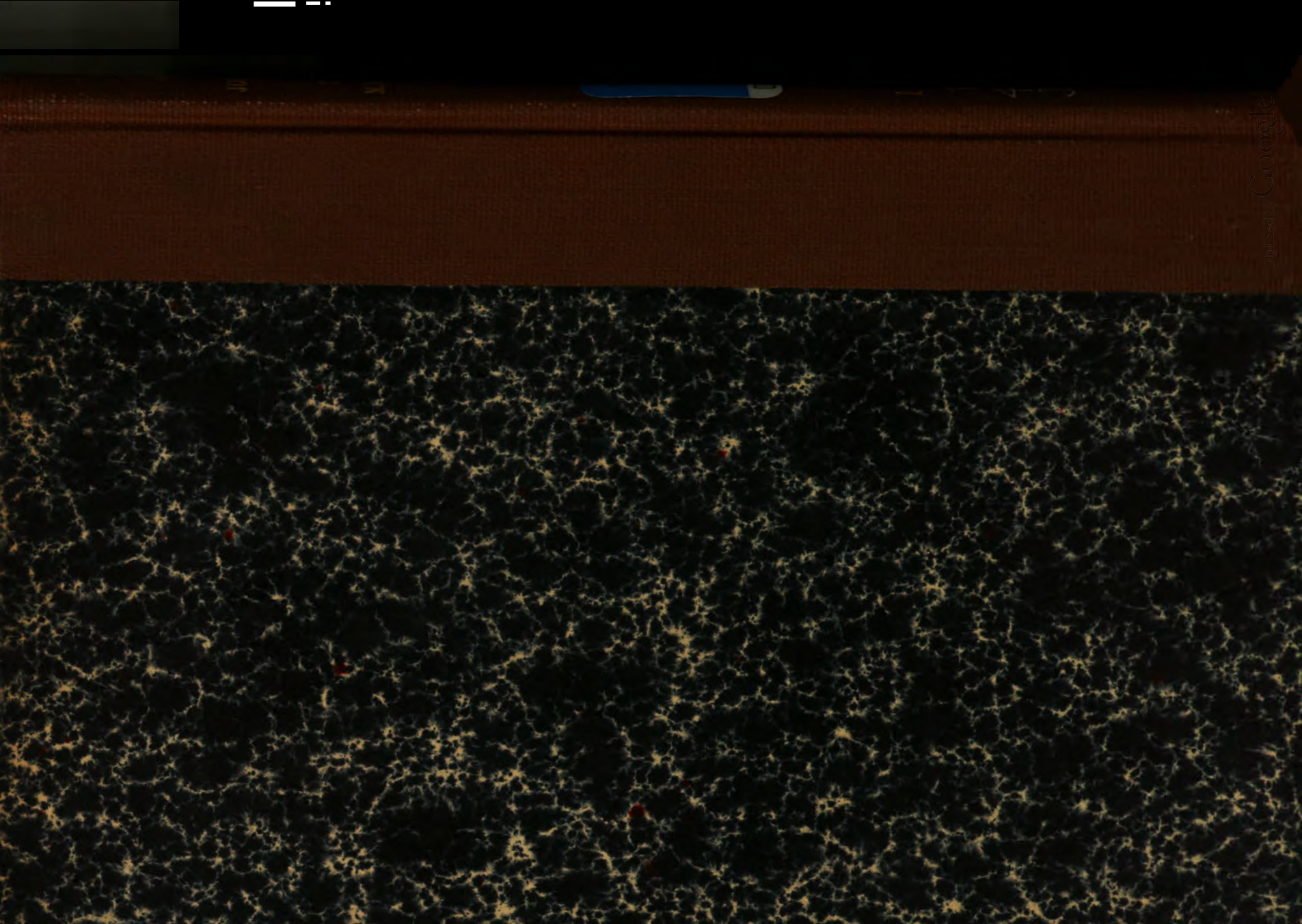

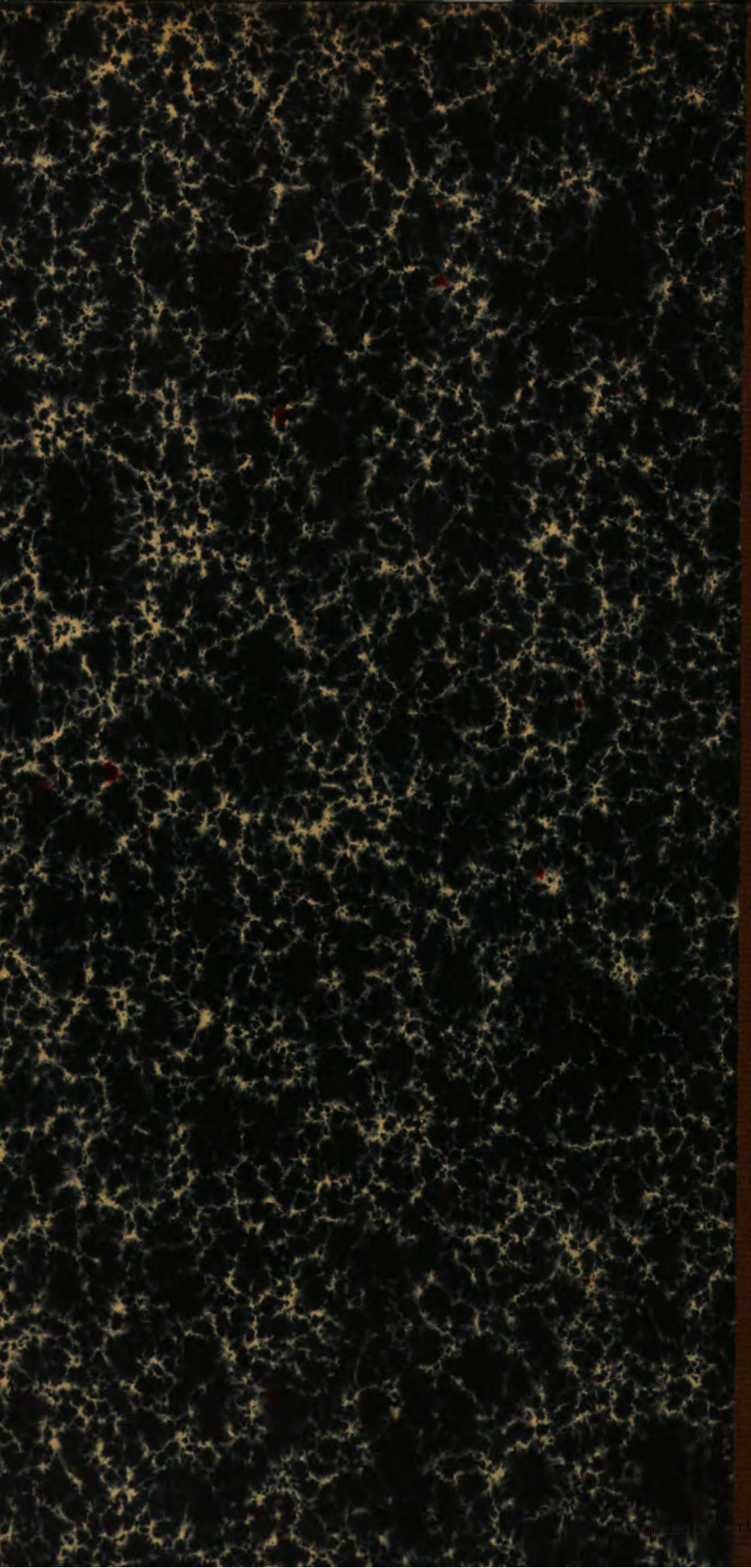
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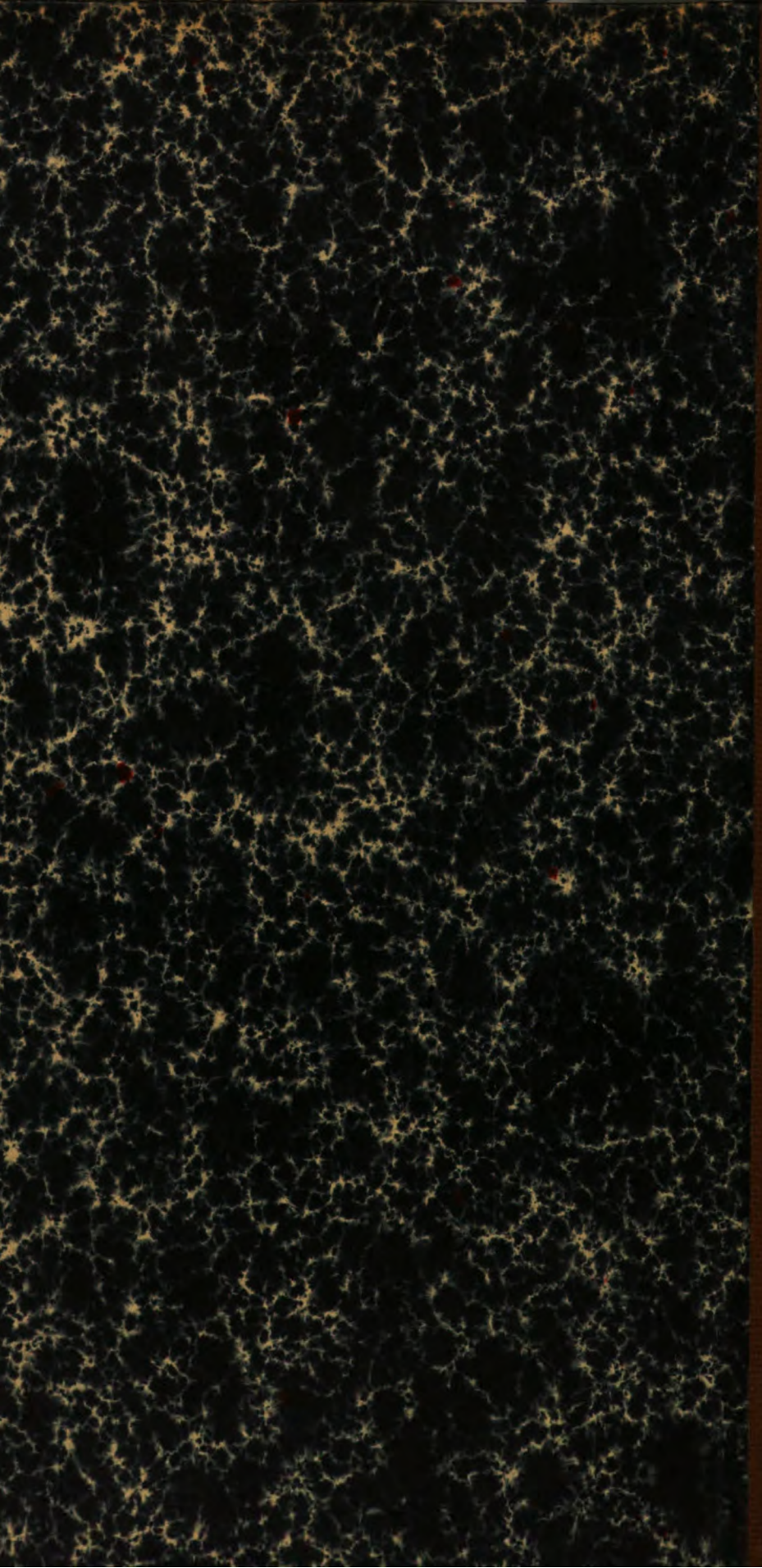
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